What About My Data?

Preparing Data for use in GeoWEPP

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Introduction

One of the first questions any user has when they are presented GeoWEPP is how to get their data into GeoWEPP. This manual will guide you through the steps needed to prepare your data so that you will be able to use it in GeoWEPP.

You can acquire data from a number of sources, but the examples used in this manual will assume you acquired your data from the NRCS Geospatial Data gateway (http://datagateway.nrcs.usda.gov/). Following data is selected from the NRCS Geospatial Data Gateway:

National Elevation Dataset 30 Meters	(DEM)
National Land Cover Dataset by State	(Landcov)
Soil Survey Geographic (SURGO 2.1) DB	(Soilsmap)
Enhanced Digital Raster Graphics 1:24,000	(Topo Images)

When NRCS asks you to select the format for vector data (which is the soils map), choose:

Vector Projection: UTM Zone listed
Vector Extent: can either be area of interest or standard
Vector File Format: Coverage.

For this example, I will be using Phoenix, Arizona as my area of interest. The files I have downloaded are:

elevation_NED30M_107186_3.zip	(DEM)
land_use_land_cover_NLCD_107186_4.zip	(Landcov)
soils_107186_5.zip	(Soilsmap)
topographic_images_EDRG24K_107186_2.zip	(Topo Images)

Unzipping the Files

All the files downloaded from NRCS are in zip format and need to be extracted. The first step is to create a folder to put this new data after you download it. I will be using the folder BLMPhoenixAZ and this will be placed on my C:\ drive. The path for this folder is C:\ BLMPhoenixAZ. One important note is that the folders you create can not include any spaces and can not be located on your desktop (since the desktop folder is actually within you Documents and Setting folder and it contains spaces).

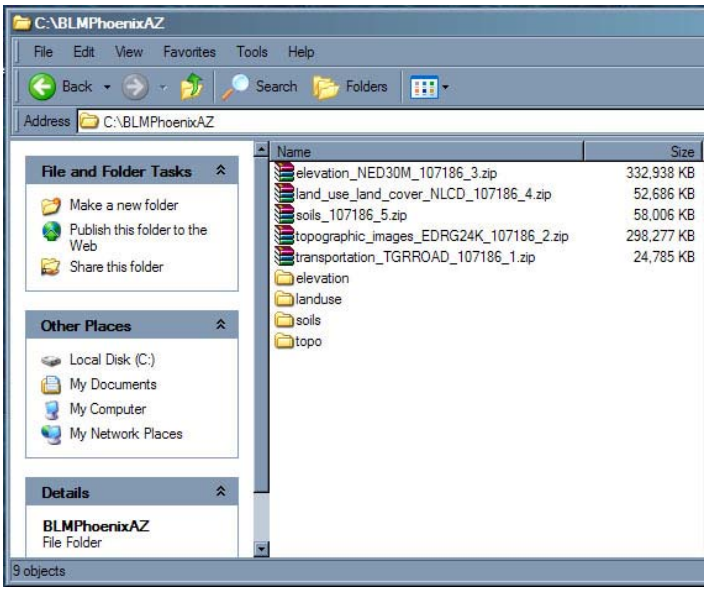


Figure 1: Downloaded Zip Files from NRCS

My folder setup in shown in Figure 1.Yours will look slightly different with different icons based on your installed software. You can use whatever program you are comfortable with to unzip the data files; there are too many programs available to go into how this can be done. Figure 1 also shows the different folders I created to hold the unzipped files: elevation, landuse, soils, and topo. Also, I created a StudyArea folder (not shown). This is the folder where all the data I am preparing for GeoWEPP will be saved. I will make reference to this folder during the preparing process.

The elevation folder contains the files needed for the DEM. The elevation zip file contains many different files, including several other zip files (with the extension .gz). These other zip files are the ones we need. You'll have to extract those files and the zipped files they contain (extension .tar). Depending on what type of unzipping software you are using, you may be able to just unzip the files you will need instead of the entire downloaded file.

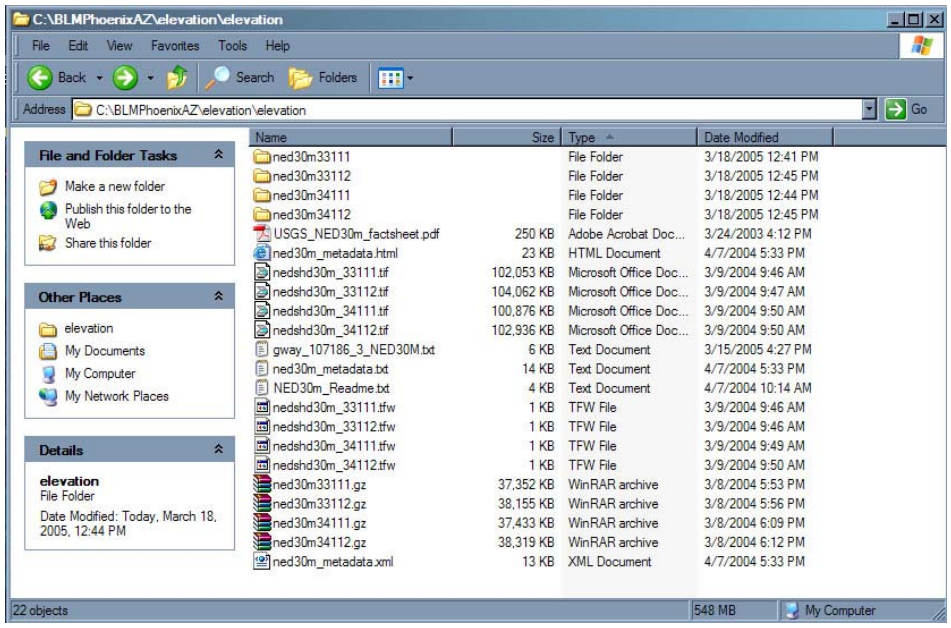


Figure 2: National Elevation Dataset extraction completed

In the example I am using, there are four folders that I need; these folders begin with ned30m (National Elevation Dataset 30 meters). Everything else can be deleted (especially if you only have a small amount of hard drive space).

The remaining zip files can be extracted in a similar way: unzip the Land Cover files into landuse, the Soils files into soils, and the topography images into the topo file. The number of files you will have will depend on the size of your study area.

During the steps outlined in this manual, you will be asked to click on a theme (like dem) to make this active. This means that you need to click on the left side of the screen in ArcView where the list of themes is located. When you click on a theme, the "box" the theme name is in will appear to be raised; this means it is now active. Some of the steps will not work correctly if a theme is not active (not raised).

Also, you can turn on and off the themes by checking (on) or unchecking (off) the small box before the themes name. This will be helpful when you are searching your topo

images. Also, by turning off some of your theme (especially the larger ones) you will reduce the amount of redraw time required.

Spatial Analysis Extension

Before we begin, make sure the Spatial Analysis extension has been checked. To turn this extension on, select File/Extensions from the menu. In the new dialog box, scroll down until you find Spatial Analysis. If is checked, the click cancel. If it is not checked, click on the box and then click OK. If you are unable to load the Spatial Analysis Extension, you will not be able to prepare your data for GeoWEPP.

The Order for Preparation

The order in which this document is laid out is a similar order that I would use to create my data sets. You can use whatever order you choose based on the data you have, but I found that this order is the easiest and reduces the amount of data you end up with.

The procedure I use is:

1. Load all the DEMS
2. Load all the topo images
3. Find the region I'm interested in using zoom-in, zoom-out, and pan
4. Turn off each topo image until I find the image or images for my region of interest
5. Go to full extent and determine which DEM or DEMs I need
6. If I have more than one topo image, create a mask by merging all the topo images
7. If I have more than one DEM, merge the DEMs into one
8. Use the mask create in step 6 to clip the DEM
9. Convert new clipped DEM to an ASCII file and save in study area folder
10. Load Land Cover data set
11. Convert Land Cover to raster
12. Clip Land Cover raster using Spatial Analysis and mask from step 6
13. Create landcov.txt to be edited later and save in study area folder
14. Convert new clipped Land Cover raster to ASCII and save in study area folder
15. Load Soils coverage
16. Determine which soil coverages I will need.
17. Convert Soils coverage to raster using the mask from step 6
18. Create soilsmap.txt to be edited later and save in study area folder
19. Convert Soils raster to ASCII and save in study area folder
20. Copy need topo images to study area folder
21. Edit landcov.txt file
22. Edit soilsmap.txt file
23. Create soilsdb.txt and/or landusedb.txt files if needed (See Advanced GeoWEPP Tools, downloadable from GeoWEPP homepage).
24. Delete unnecessary files, like all the sources files I used to create study area data.

This seems like a lot of work and could be complicated. You don't have to worry; I'll guide you through all the steps you need to prepare your data. When you are done, you'll have the necessary files to run GeoWEPP on your study area - trimmed down to much smaller files than what you started with.

1. Topographic Image Preparation

You might be thinking that this is the least important step and should be more towards the end of this manual, but you may be wrong. One of the biggest problems you will face when downloading and preparing data is the size of the files. The larger the files, the longer it takes for any of the preparation steps to process, the longer it takes for GeoWEPP to load the needed files, and the longer it takes for TOPAZ to create the channels for your study area. In fact, if the DEM file is too large, TOPAZ may not be able to process the channels. Don't worry; this has only happened to me when I was trying to create channels based on a DEM that covered about a quarter of Arizona. The purpose of GeoWEPP is to analyze much smaller areas, like study areas that cover only one to four topographic images.

The steps below will guide you through the process of how to load the topo images into ArcView and determine which ones you need. The steps will also guide you through the creation of a mask ("cookie cutter") that will be used later to clip your other layers. This will reduce you file sizes and load time in GeoWEPP.

Determining What Topo Images You Need

The data I downloaded from NRCS includes 99 topographic images; far more than I actually need. My study area may only be in a few of these images, so I need to determine which images I need. With luck, I may only need one. But there is a chance that my study area will intersect two to four of these images. The steps below will cover how to load all these images and how to determine which ones are needed.

Are these images really needed? No; GeoWEPP doesn't use any of the information in these files to run. But, these images will help you find your study area, help you understand what is in the area, and can help reduce the size of the files you will be creating. It would be best to go through these steps, but they are not required. If you have only one topo image, you can move on to the DEM preparation.

1. Load your topo images by either selecting View/Add Theme or clicking the Add Theme button  . Navigate to the folder where your topo images are stored.

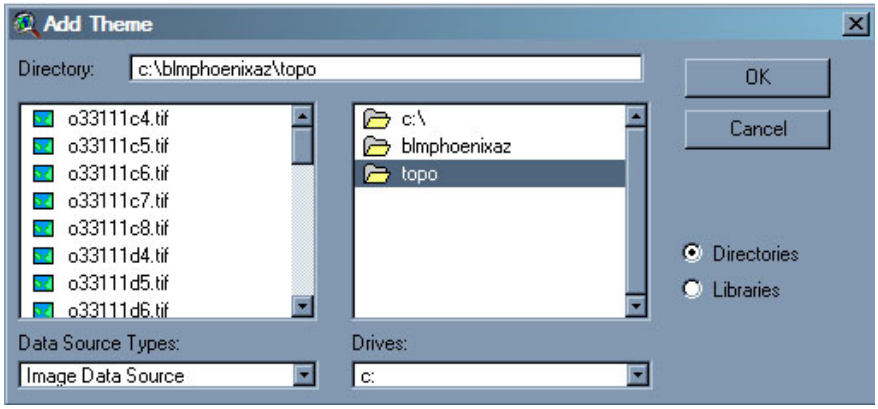


Figure 1-1: Loading the images from the topo data folder

Make sure you select Image Data Source in the Data Source Types dropdown list. The resulting list are all TIFF images (.tif).

2. Click on the first tiff image on the screen
3. Hold done the Shift button and press the arrow down key until you get to the last tiff image. Then click OK. If nothing happens, hold down the Shift key again and press the up arrow key once. Click OK. Some times you may arrow down too far and the dialog box doesn't like it, that's why you should arrow up

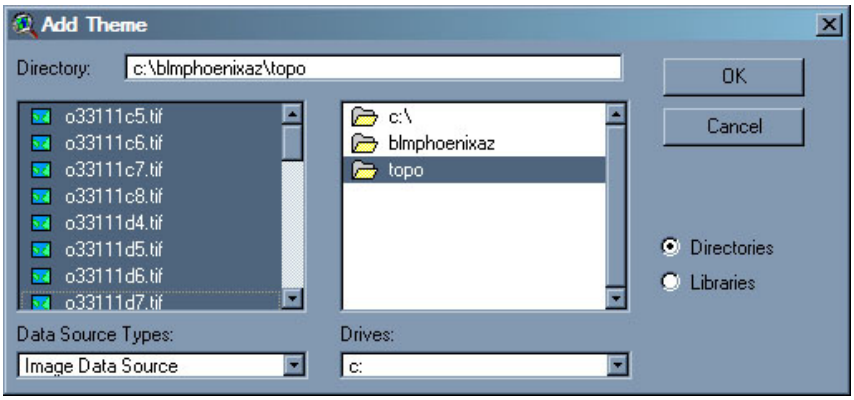


Figure 1-2: All images selected

4. ArcView will load all the topo images, but will not turn them on. You need to check the box next to each topo image name to turn them on.

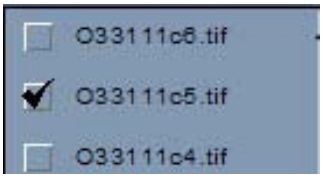


Figure 1-3: Checked Box

5. Once all the topo images are on, navigate to your study area using zoom-in, zoom-out and pan  .
6. Once you have found your study area, turn of each of the topo images by unchecking the box until you find the topo image or images you need. Turn off the remaining topo images.

7. Delete all the unchecked themes by holding down the Shift key and clicking each unchecked theme in the list on the left. Next select Edit/Delete Themes from the menu. Click Yes to All in the dialog box that appears.

8. If you have more topo images in the theme list, repeat step 7 until all that remains are the checked topo themes.

9. Write down the names of these topo images and then minimize ArcView.
10. Copy these files from the topo folder to the StudyArea folder. Each topo image has two files associated with it; they have the extensions .tif and .tfw. Copy both files for each tiff image you need.

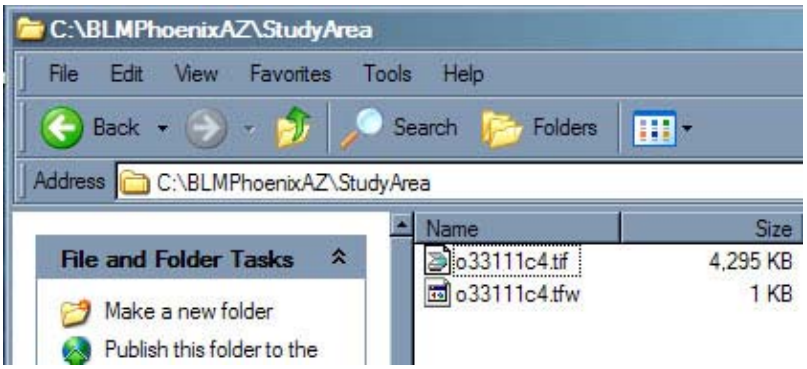


Figure 1-4: Copied topo image files

Creating the Mask

You have now determined which topo images are associated with your study area and transferred them to your data folder. The benefit of this is now you can trim all the excess data from your other layers. If you have more than one topo image (I have two in my example set), you will need to merge these images into one, creating a mask. This is done by creating a simple script – a small computer program. Don't worry; you will not need any advanced programming skills since I have already done the hard work. All you need to be able to do is type and/or copy and paste. Just follow the steps below:

1. Maximize ArcView, if you haven't done so, and minimize View1.
2. Click the Scripts Icon and then Click New. Your screen should look like this:

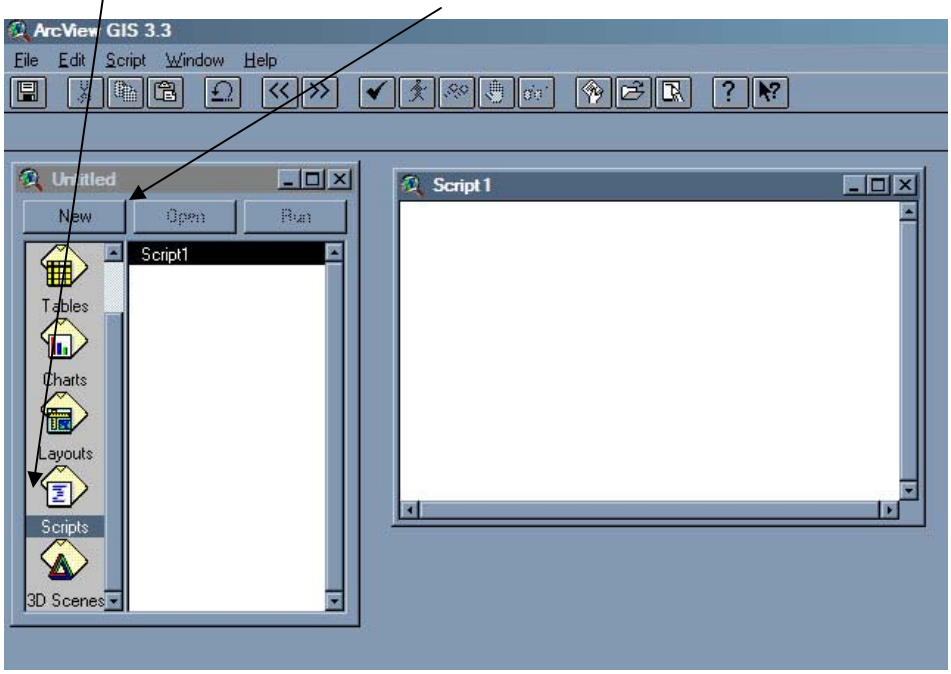


Figure 1-5: New script, Script 1, has been created

3. Next, type or copy and paste the following script into the Script1 window. This script is written to merge two topo images, but it is also prepared to merge four images. If I wanted to merge four images, I would remove the single quote (‘) from in front of grid3, grid4, and the second theGridList, an then put a single quote in front of the first theGridList (see Figure 1-6).

```
theView=av.GetProject.FindDoc("view1")


grid1 = theView.findtheme("topo1").getgrid
grid2 = theView.findtheme("topo2").getgrid
'grid3 = theView.findtheme("topo3").getgrid
'grid4 = theView.findtheme("topo4").getgrid

theGridList = {grid1, grid2}
'theGridList = {grid1, grid2, grid3, grid4}
outGrid = grid1.Merge(theGridList)

  topo = GTheme.Make(outgrid)
  theView.AddTheme(topo)
```

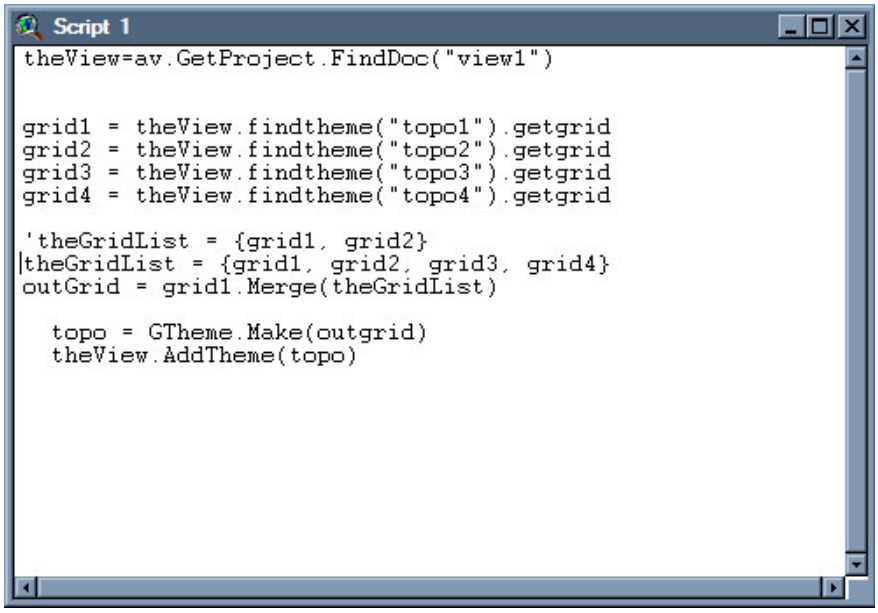


Figure 1-6: Modified Script 1 to merge four topo images

4. Click the Checkmark  on the toolbar. This will check the script to ensure it can be run.

5. Before this script can be run, you’ll need to convert the topo images into grids. Maximize View 1 and make the first topo image theme active. Then select Theme/Convert to Grid from the menu. Navigate to the folder where your

topo images are located. Enter topo1 as the new grid's name (See Figure 1-7). Click Ok. Click Yes to add the new grid theme to the view.

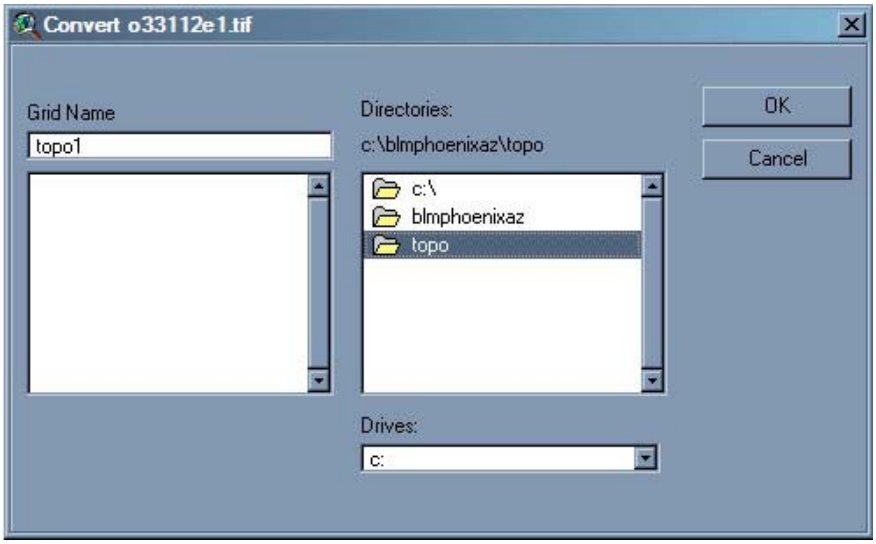


Figure 1-7: Convert Topo Image to Grid

6. Repeat step 5 for the remaining topo images. Make sure the name match which image you are working with (the second image should be named topo2, the third image should be topo3, the fourth is topo4, and so on).

7. Once you have converted all the images to grids, minimize View1 and click the Script1 window. On the toolbar, you will see what looks like a person running  (it is next to the checkmark). Click that button. The script will now run and merge all the topo images into one grid. At the bottom of the screen, you'll see a progress bar. The task is complete once the bar reaches 100%.

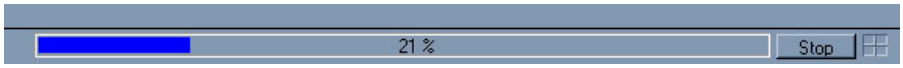


Figure 1-8: Merging Process Bar

8. Once the merging process is complete, the theme at the top of the list will be the newly created mask. Click Theme/Save Data Set. Navigate to the topo folder and enter the name mask. Click OK. Change the name of the theme (as you did above) to Mask.

You have now finished the first steps in preparing you data. The mask will be important in later steps. Before going on, it would be best to remove any unneeded themes. The only theme you should have in the list should be either the Mask theme or the one topo image you need. If there are any other themes present, remove them the same way you did earlier. Now you can proceed to preparing the DEM.

2. DEM Preparation

At this point you should have been able to determine what topographic images you will need to use and may have created a mask layer based on a number of these images. We will use this image or mask to help determine which DEM or DEMs you will need. This section covers how to determine the DEMs you will need, as well as, how to merge multiple DEMs if you study area is in more than one DEM. Towards the end we will use a single topo image or the mask to clip the DEM to a smaller file size. Finally, we will convert the DEM to the ASCII file format that GeoWEPP uses. Some of the steps we go through here will be repeated for the Land Cover data set.

Discovering Which DEM to Use

In my example set, I have four DEMs; way too much to use in GeoWEPP. I will use the topo images to determine which DEM or DEMs I may need. If you only have one DEM, you can skip to "Clipping the DEM" below.

1. Load your DEMs by either selecting View/Add Theme or clicking the add theme button  . Navigate to the folder where your elevation data is stored.

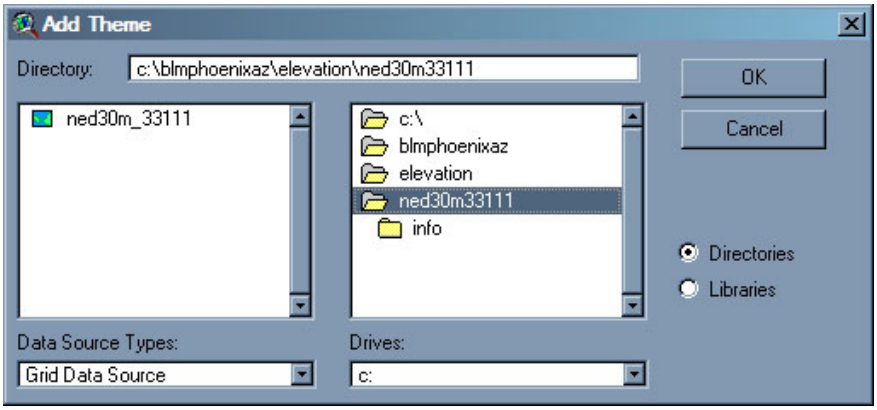


Figure 2-1: Loading the DEM from the elevation data folder

   Make sure you select Grid Data Source in the Data Source Types dropdown list. In my example, the DEMs I'm looking for will have "ned30m" as the first part of the name. Click on the DEM on the left and then click OK.

2. Once all the DEMs are loaded, move them to the bottom of the list. To do this, click and hold down the mouse button on a DEM theme in the themes list on the left on the screen. Drag the mouse to the bottom of the list and release the button. The DEM you just move should now be at the button of the list. Repeat for the remaining DEMs. OR: Move the Mask theme to the top of the list using the same process.

3. Make each of the DEMs visible by checking the box in front of each DEMs' name. Also make the topo image or the mask visible, if it isn't already.

4. You should now be able to see where your mask or image is in relation to the DEMs. Turn off each DEM to determine which DEM is needed (the same way you determined which topo images you needed earlier). Remove the DEMs you do not need.

If you only need one DEM, skip to "Clipping the DEM". If you need more than one, continue on to the next section.

Merging the DEM

The Digital Elevation Model (DEM) will be used to derive the channel network and the slopes of your watershed. GeoWEPP will only recognize one DEM layer, but the data you are working with may have multiple DEMs. There is an easy way to correct this problem: merging the DEMs. This is done using a similar script to the one used with the topo images. The steps are restated below, just in case you didn't need to merge the topo images.

1. Create a new script just like the one created in the Topographic Image Preparation section. Script 2 should appear (Script 1 if you did not need to write a topo merging script earlier).

2. Next, type or copy and paste the following script into the Script2 window. This script is written to merge two DEMs. It is also prepared to merge four DEMs. For my example set, I would remove the single quote (') from in front of grid3, grid4, and the second theGridList. I would out put a single quote in front of the first theGridList (see Figure 2-2).

```
theView=av.GetProject.FindDoc("view1")

grid1 = theView.findtheme("dem1").getgrid
grid2 = theView.findtheme("dem2").getgrid
'grid3 = theView.findtheme("dem3").getgrid
'grid4 = theView.findtheme("dem4").getgrid

theGridList = {grid1, grid2}
'theGridList = {grid1, grid2, grid3, grid4}
outGrid = grid1.Merge(theGridList)

  dem = GTheme.Make(outgrid)
  theView.AddTheme(dem)
```

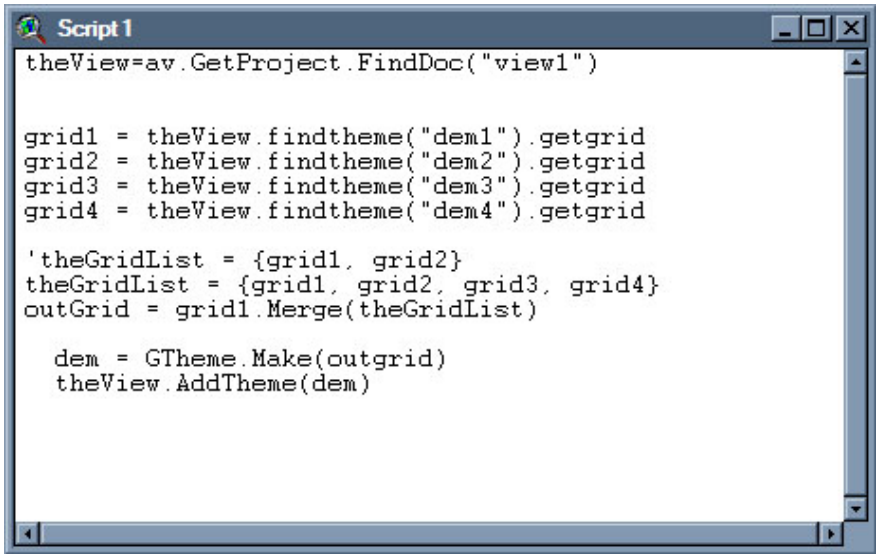


Figure 2-2: Modified Script 1 to merge four DEMs

3. Click the Checkmark  on the toolbar. This will check the script to insure it can be run.

4. Once all you DEMs have been loaded you need to make a few changes to your DEM themes so they will work with Script 2. Click on the first DEM theme to make it active, and then select Theme/Properties from the menu. A properties box will appear. At the top is the current DEM name. Change this to dem1 and click OK. In figure 2-3, I would change Ned30m_33112 to dem1 and click OK.

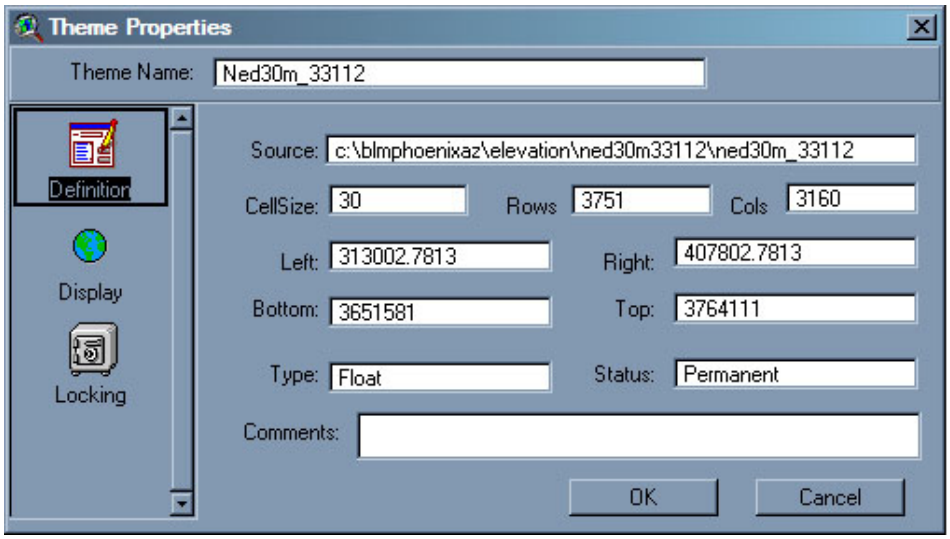


Figure 2-3: Theme Properties Dialog Window

5. Repeat step 7 for the remaining DEMs. Make sure the name match which DEM you are working with (the second DEM should be named dem2, the third DEM should be dem3, the fourth is dem4, and so on).

6. Once you have changed all the names, minimize View1 and click the Script2 window. On the toolbar, you will see what looks like a person running  (it is next to the checkmark). Click that button. The script will now run and convert the all the DEMs into one DEM. At the bottom of the screen, you'll see a progress bar. The task is complete once the bar reaches 100%.

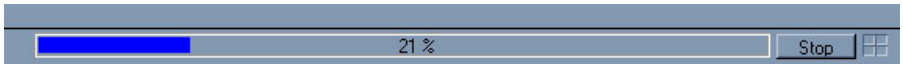


Figure 2-4: Merging Process Bar

7. Maximize View1 and you will see a new grid. This is the combine DEM for you study area. All that you need to do now is follow the steps to clip the DEM and create an ASCII DEM file.

Clipping the DEM

Many of the files that you will start off with will be too large resulting in long wait times for loading and processing. Clipping these files is one way to reduce this wait time and also conserve disk space. The example sets included with GeoWEPP have been clipped so that the resulting data only covers from one to two topographic images.

Clipping can be done to one or more files depending on how small you need to have you data folder. In my example set, I do not want a DEM that covers about a quarter of Arizona, so I'm going to clip it. To perform a clip, you will need the file you wish to clip and a file to be the "cookie cutter". This is where the topo image or mask you created earlier comes into play.

The steps to clip the DEM are simple and easy.

1. Click on the DEM or merged DEM theme to make it active.
2. Select Analysis/Properties from the menu.

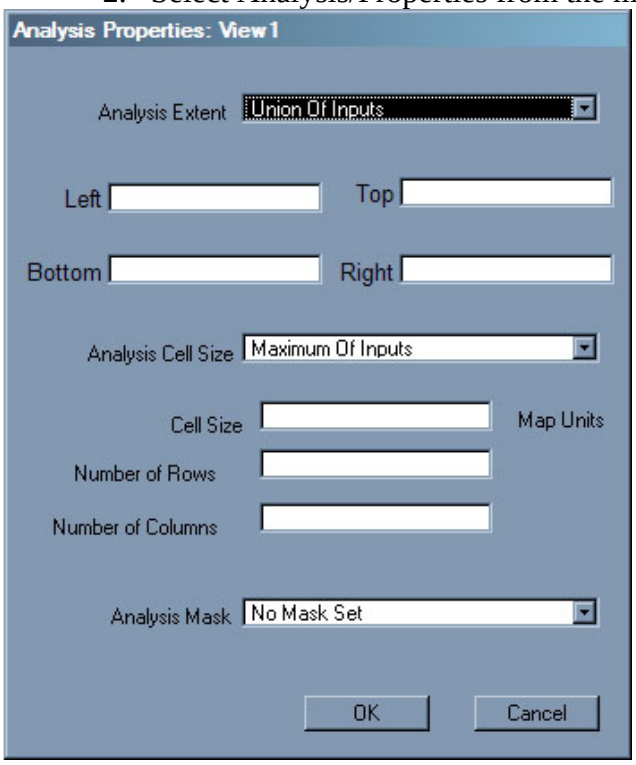


Figure 2-5: Analysis Properties Dialog Box

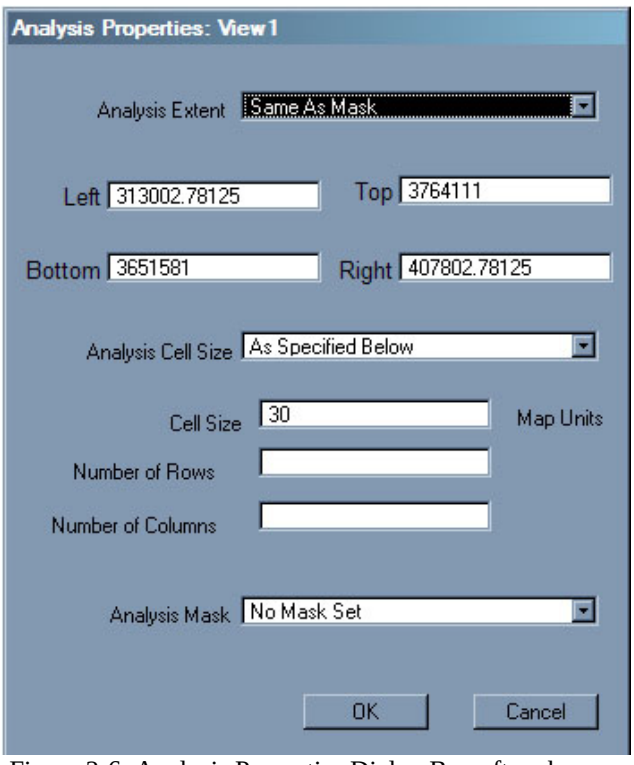


Figure 2-6: Analysis Properties Dialog Box after changes

3. Change the Analysis Extent to Same As Mask (or to the name of the topo image you would be using instead).
4. The only other piece of information you need to at this point is the cell size. The cell size, in this example, is based on the DEM cell size – 30 meters. In the cell size box, enter 30 (See Figure 2-6). Click Ok.
5. Next, select Analysis/Map Calculator from the menu. The Map Calculator dialog box will appear. All you need to do is double-click the name of your DEM from the Layers list in the upper left corner of the dialog box. Once this is done, click Evaluate.

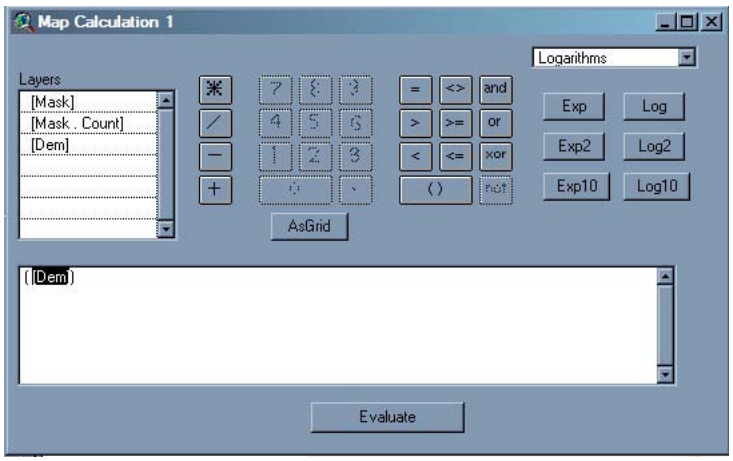


Figure 2-7: Map Calculator Dialog Box

6. The result will be a temporary raster call Map Calculation 1. You will need to save this before you can go on. Select Theme/Save Data Set from the menu. Navigate until you get to the folder that contains your DEM files. Choose a new name for the file (I selected dem) and click OK. Unlike before, a new theme will not be added. It may seem nothing happened, but it did save Map Calculation 1.
7. Change the name of Map Calculation 1 to the file name you selected in step 6 (dem) by selecting Theme/Properties from the menu like you did in previous steps.

That is all that is needed to convert and clip the DEM into a smaller raster file. All that is left to do is to convert the clipped dem theme into an ASCII file.

Converting the DEM to ASCII File

Now, we'll convert the DEM into an ASCII file. Remember that we will be saving the ASCII file in the StudyArea folder that was created in the "Introduction".

1. Choose File/Export Data Source from the menu. In the Export Data Type, make sure ASCII Raster appears in the selection box and click OK.

Figure 2-8: Export dem as ASCII Raster

2. Next you will be asked to supply the Grid to be exported. This is why we save the map calculation earlier; it is a tempery grid that is not save anywhere. Since you converted it, you now know where it should be (and it is probably already at the proper location – see Figure 2-9).

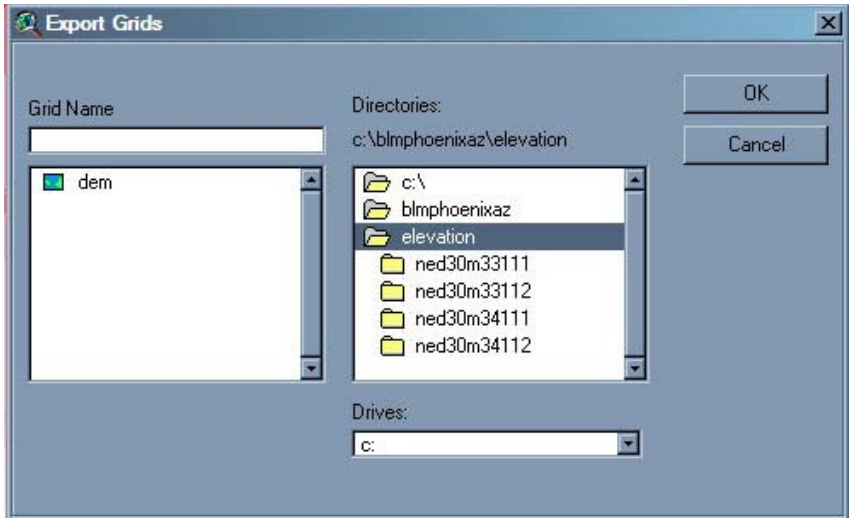


Figure 2-9: Choosing the grid to Export.

3. In the next dialog box, you will need to navigate to your data set folder you created earlier (StudyArea for example). The default name for the ASCII file is export1.asc. Change this to dem.asc. Click OK and wait for the conversion to be completed.

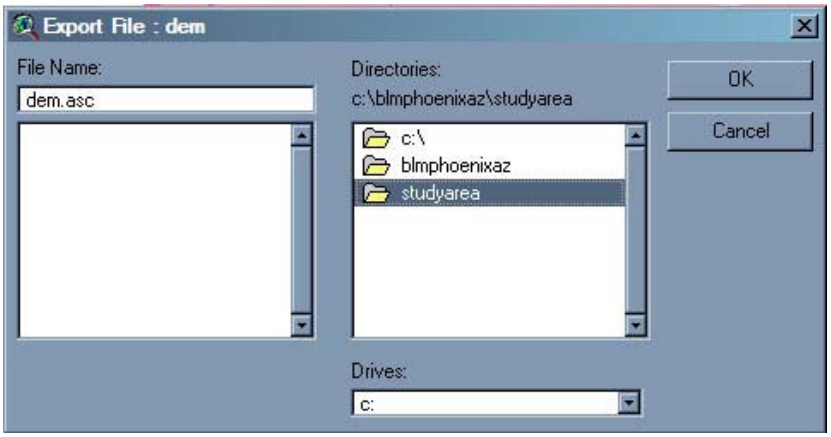


Figure 2-10: Saving dem.asc in the data folder

The conversion and preparation process for your study area's DEM is complete. Now we will move on to preparing the Land Covert data.

3. Land Cover Data Set Preparation

The most important part is now over; you've finished preparing the one required file needed by GeoWEPP. In this section, we will cover how to prepare one of the optional files for GeoWEPP. Optional? Yes, the land cover layer is not needed to run GeoWEPP, but it will make your research easier. If the land cover layer is not loaded, GeoWEPP will ask you to choose a land management for your entire study area. By adding a land cover layer, you'll be able to see use the onsite results; without the land cover layer, the onsite results will be the same as the offsite results (See the tutorials for more detail). This also applies to the soils layer covert later.

The land cover data that is downloaded from NRCS is for the entire state and you may receive more than one state if your study area crosses state borders. These files are very large and need to be converted into grid format before we can make them smaller. Once in the grid format, we can merge and clip them in the same way we clipped the DEM.

The end of this section contains instructions on how to start creating the landcov.txt file that is required for GeoWEPP and WEPP/TOPAZ Translator to work properly. This files explanation and manual creation are covered in Advanced GeoWEPP Tools located on the GeoWEPP Homepage.

Land Cover Conversion

To do this, we use a process we learned above, Theme/Convert to Grid. But first, remove all theme except the topo image or the Mask.

1. Load the Land Cover into ArcView the same way the DEMs were loaded by using View/Add theme from the menu or by using the Add Theme button on the toolbar. Select Image Data Source for the Data Source Type and navigate to the folder where the land cover dataset is located.

2. Select the file displayed on the left; it should end in .tif. For my example, the file if nlcd_az_utm12.tif (National Land Cover Dataset, Arizona, UTM Zone 12, tif file). If you have more than one .tif file you wish to load, click the first one, hold done the Shift key and click the other Land Cover image(s). Then click OK.

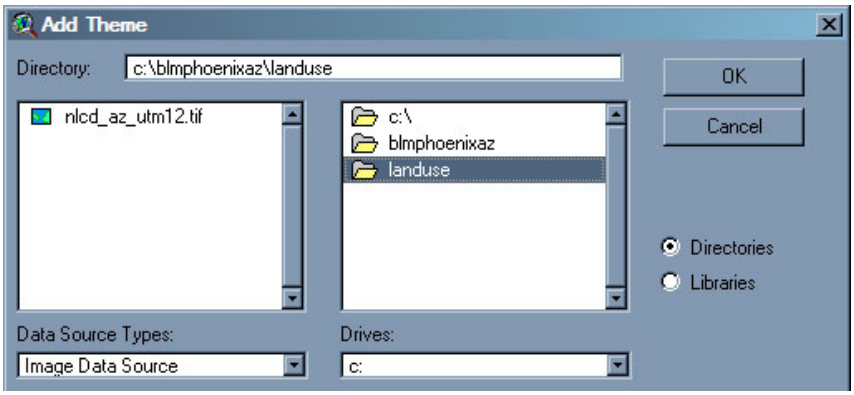


Figure 3-1: Add Landuse TIFF File to View

3. Once the Land Cover image has been loaded, click on the Land Cover theme to make it active and then select Theme/Convert to Grid from the menu.

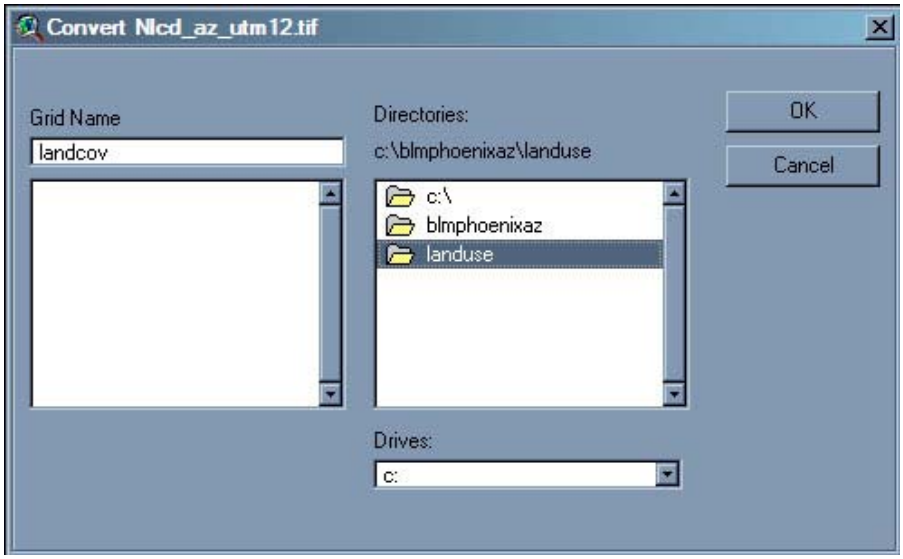


Figure 3-2: Convert Land Cover TIFF to landcov grid

4. Navigate to the landuse folder and select a name for the new grid theme. In the Figure 3-2, the destination folder is C:\BLMPhoenixAZ\landuse and the new grid name is landcov. Click OK and wait as the conversion process goes to completion.
5. Turn on the new grid file by checking the box next to the themes name. As you can see, this is one very large file – larger than the DEMs. The next steps will clip out the section of the landuse you will need based on the topo image you selected or mask you created earlier.

Clipping the Land Cover Raster

The land cover file covers an entire state – or more if you study area crosses state bounds. This file is very large and takes time to load and process, so we should clipped the file to match the size of the DEM we prepared earlier. The clipping steps are the same for the land cover as they are for the DEM.

If you are working with more that one state, you will have to covert all the land cover files to grids and then merge them like you did for the topo images and/or the DEM. I won't go into detail about how to do this, but it is simple. Rename each land cover grid – use something like land1 and land2. Create a new script and copy and paste either of the scripts we used earlier. Change the names in the new script to match the names you just created. For example, if you are using the merge DEM script, you would change "dem1" to "land1" and "dem2" to "land2". This is all you need to change since the term "dem" is just a variable and will not affect the results. Click the checkmark button and then the run button. Follow the remaining steps of the process and name the resulting merged grid "landcov".

The steps to clip the landuse are simple and easy.

1. Click on the landcov theme to make it active. Steps 2, 3, and 4 cover changing the Analysis Properties. If you have already clipped the DEM, the properties are already set, so you can skip these steps. If you are starting fresh again, you will need to set these properties the way they are outlined in steps 2, 3, and 4.
2. Select Analysis/Properties from the menu.

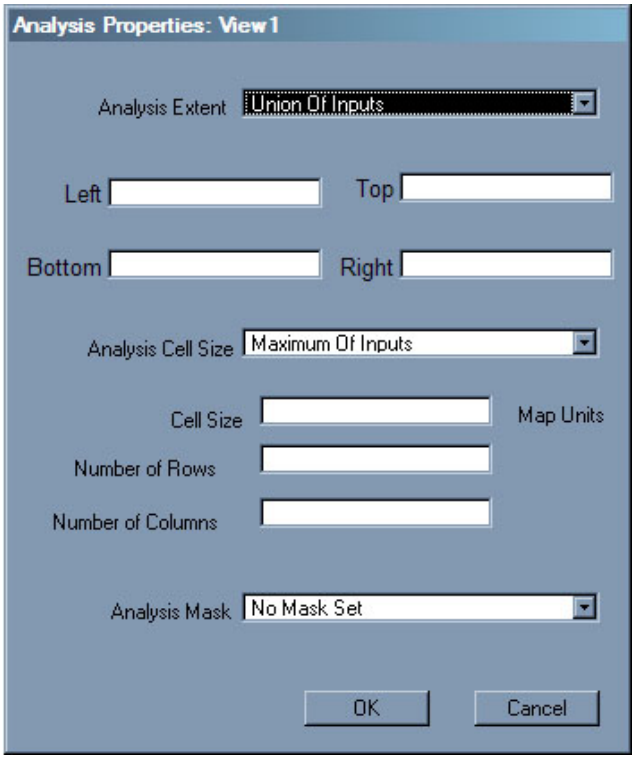


Figure 3-3: Analysis Properties Dialog Box

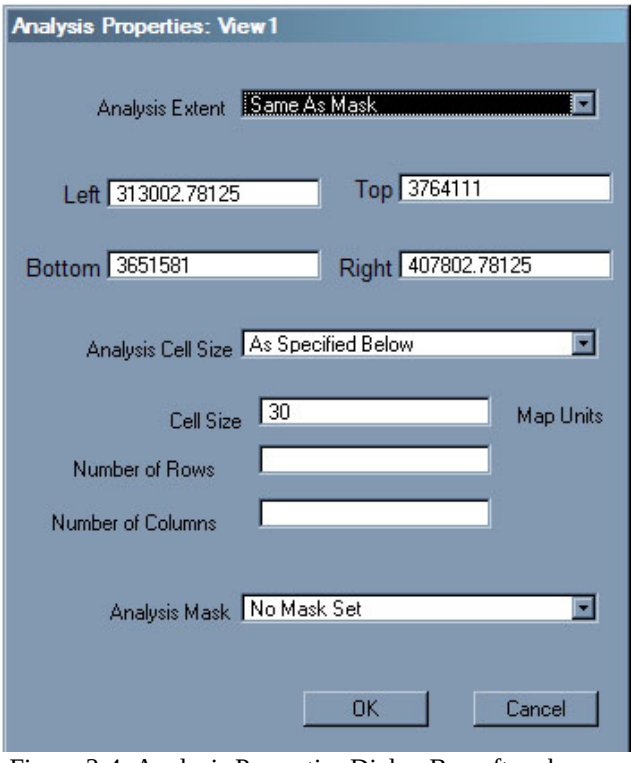


Figure 3-4: Analysis Properties Dialog Box after changes

3. Change the Analysis Extent to Same As Mask (or to the single topo image).
4. The only other piece of information you need to at this point is the cell size. The cell size, in this example, is based on the DEM cell size – 30 meters. In the cell size box, enter 30 (See Figure 3-4). Click Ok.
5. Next, select Analysis/Map Calculator from the menu. The Map Calculator dialog box will appear. All you need to do is double-click [landcov] from the Layers list in the upper left corner of the dialog box. Once this is done, click Evaluate.

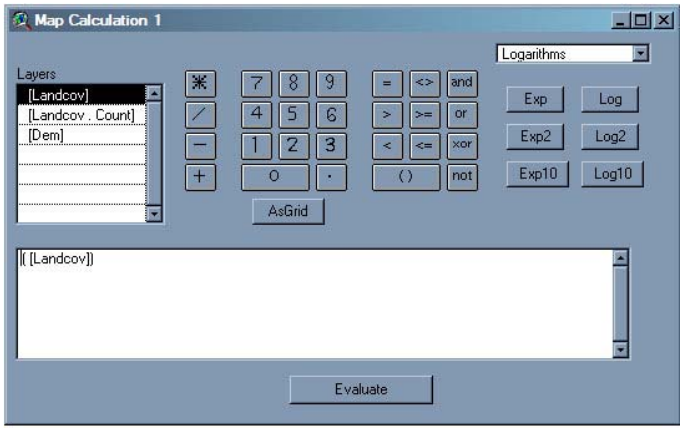


Figure 3-5: Map Calculator Dialog Box

6. The result will be a temporary raster call Map Calculation. You will need to save this before you can go on. Select Theme/Save Data Set from the menu. Navigate until you get to the same folder you saved the landcov layer above. Choose a new name for the file (I selected landcov2) and click OK. Unlike before, a new theme will not be added. It may seem nothing happened, but it did save Map Calculation.
7. Change the name of Map Calculation to the file name you selected in step 6 (landcov2) by selecting Theme/Properties from the menu like you did in previous steps.

That is all that is needed to convert and clip the large land cover data set into a smaller raster file. All that is left to do is to convert the landcov2 theme into an ASCII file (the same way we converted the DEM to ASCII) and to create a landcov.txt file.

Creating the ASCII file of the Land Cover Data

Use the same process to create the ASCII file of the land use data as you did when we created the ASCII DEM file. Remember to name the file landcov.asc and save it in the same folder as the dem.asc (in this example: C:\ BLMPhoenixAZ\StudyArea).

Creating the Landuse.txt

In Advanced GeoWEPP Tools, the manual creation of the landcov.txt is covered. This is good to know if you need to change, add, or recreate this file. In this section we will cover how to begin this process if you are not sure what numbers are being used in the landcov layer. This may get a little complicated to do, but it could save some time later. If you find this portion too troublesome or confusing, please follow the direction in Advances GeoWEPP Tools; this manual also provides steps to create a generic landcov.txt file if you are using the NRCS National Land Cover Dataset, which is easier then the steps below. If you are not using NRCS data or you are not sure where your data is from, follow the steps below to create the initial landcov.txt file and then follow the steps in Advances GeoWEPP Tools to change this file.

1. Make sure the landcov2 theme (or whatever you called it from the pervious steps) is active. If not, click on it in the theme list.
2. Click the Open Attribute Table button on the toolbar  . This will open the table associated with landcov2. This table will only have two columns: Value and Count. Value is the information we need; it is the number that is located in each cell – in this case, the USGS land cover number scheme. The count is the number of cells that have that value in it; this column is not needed.

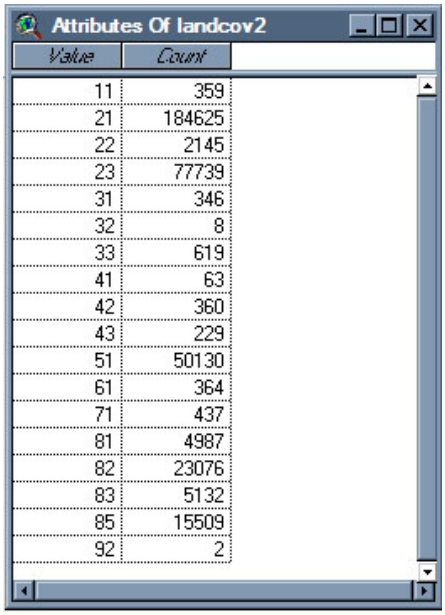
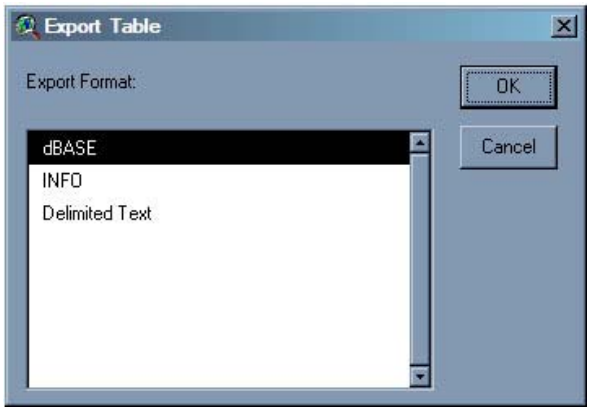


Figure 3-6: Landcov2 Attribute Table

3. While the attribute table is open, select File/Export from the menu. This will load the Export Table Dialog Box. Click on Delimited Text and then OK.



4. The Save Dialog box will appear next. Navigate to your study area folder (in this example: C:\ BLMPhoenixAZ\StudyArea) and change the file name to landcov.txt. You must name it this way or it will not work in GeoWEPP. Click OK.

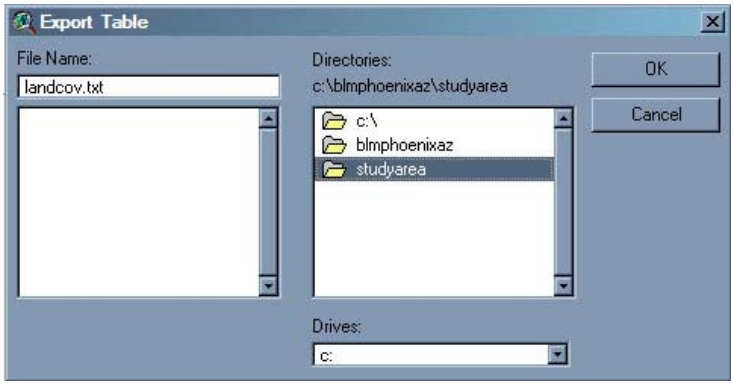


Figure 3-8: Save Table as landcov.txt

5. The resulting text file will not be in the same format as you see in the Advance GeoWEPP Tools. You will need to change this file to match the format correct format.

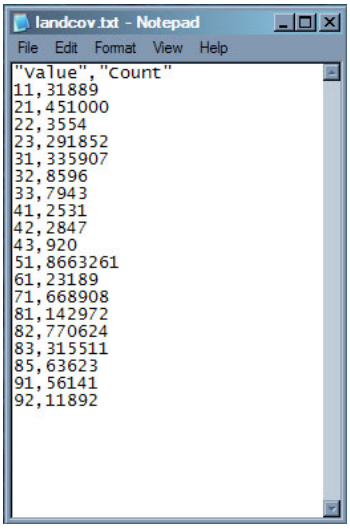


Figure 3-9: Landcov.txt (unedited)

You now have finished preparing the land cover layer (landcov.asc) for use in GeoWEPP. Now you will need to modify the landcov.txt file so that it is in the correct format. The benefit of creating this file the way we did is that the first column in the text file will be the numbers used in the landcav.asc. This way, you will not forget a number if you try to create this file manual.

4. Soil Layer Preparation

This is, by far, the most difficult and complicated part of the data preparation. In this section you will have to use some more advanced GIS work than you may be use to. If you find the following steps too difficult or complex, I have two suggestions for you: just convert and do your best with the soilsmap.txt file or use on global soils layer and then change the soils when you use WEPP. The downside with the second choice is that the onsite results will not be as accurate as they could be. Once you run GeoWEPP on a watershed, you can change each hillslope soil (see tutorials), but this still isn't the same.

The problem we face with the NRCS Soils data is that, when it is converted to a raster (grid) theme, ArcView assigns number values to each cell starting from 0. It does not assign the Mukey number (the soil identification number) to the cell. When this theme is converted to an ASCII file (soilsmap.asc), it records these values and not the Mukey values in the file. So, when you load the soils layer into GeoWEPP, you'll get values starting at 0 and not the 5 digit soil identification number. How can you get around this problem? The first conversion method below will guide your through a simpler process that will require you to edit the soilsmap.txt file at the end. It is simpler than the second method, but **IT ONLY WORKS IF YOU HAVE ONE SOIL COVERAGE IN YOUR STUDY AREA**. This is very important to remember, because if you try it with multiple soil layers, the numbers ArcView assigns each soil will not be the same. For example, if the smallest soils id number is 53324 in one layer and 53295 in another layer, ArcView will assign both of them the value of 0 during the conversion process.

Unfortunately for me, my study area overlaps three different soil themes. Therefore, I need to use the more complex version.

<u>Soils Layer Conversion (The easier way)</u>

Once again, we need to convert the soils data into a format that GeoWEPP can use – namely an ASCII file and a text file. The soils layer comes in one of two formats from NRCS: coverage and shapefile. The procedures below convert a coverage; but, don't worry, because these same steps are used to convert the shapefile as well. The procedures below will guide you through the conversion process. Before you begin, it would be best to remove all the themes in the theme list except for the Mask theme or the topo image theme. **REMEMBER:** This procedure is used if your study area is within one soil theme.

1. Add the soils layer by clicking either the Add Theme button on the toolbar or be selecting View/Add Theme from the menu.
2. When the Add Theme dialog box appears, change the Data Source Type to Feature Data Source. Navigate to the folder that contains the soils data. In my example, my soils data is located in C:\BLMPhoenixAZ/soils. Within this folder you will see a folder, or folders, with a name beginning with "soil_". Open the first folder to reveal more folders. Open the spatial folder; several coverages will appear in the list box on the left. Click on the one that begins with "smu_" and then click OK.

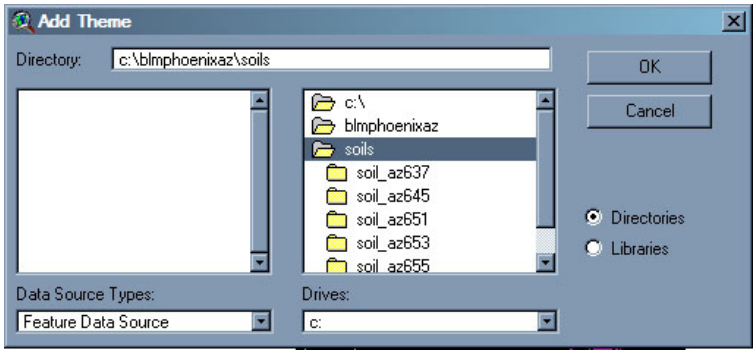


Figure 4-1: Multiple "Soil_" folders within soils data folder

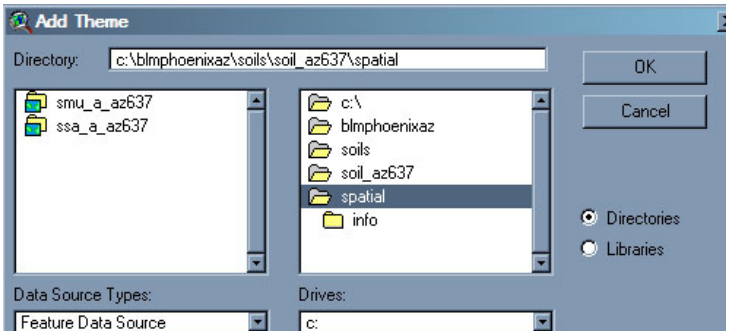


Figure 4-2: Coverages located with spatial folder of "Soil_" folders

3. During this conversion process, the resulting grid may be clipped from the mask for you without any extra steps. In the Land Cover conversion section, we change the Analysis Properties so that the resulting grid from the land cover image would be clipped. If you have not restarted ArcView, this change will still be in place, so when you convert the soils coverage to a grid, the resulting grid will already be clipped. If you have restarted or have not made these changes, do it now by following the steps in the Land Cover conversion section.
4. Now to convert the coverage to a raster. Make to soils theme active and select Theme/Convert to Grid from the menu. Navigate to the soils data folder and choose a name (like soilsmap). Click OK.

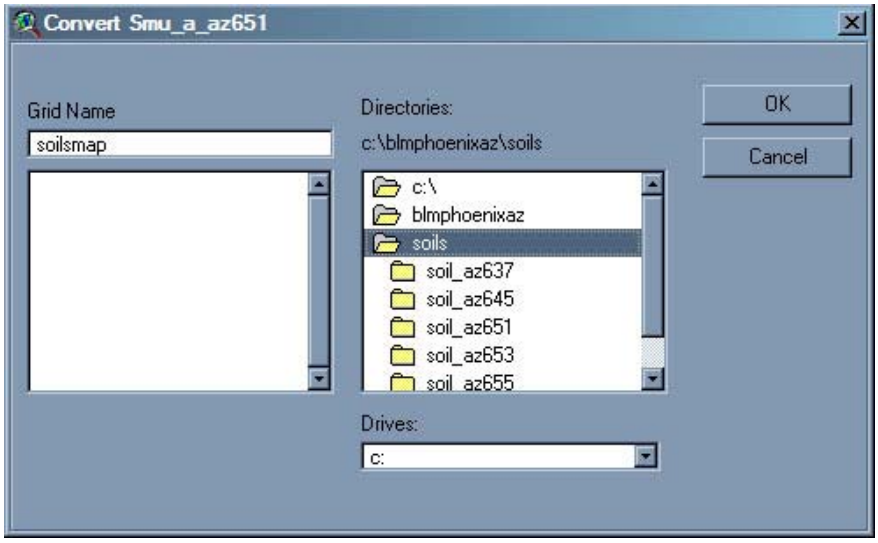


Figure 4-3: Convert Soil Coverage to Soilsmap Grid

5. Next, you will need to choose which attribute to be included in the new grid's attribute table. We need to select the attribute that contains a unique value for each type of soil in the coverage. In this case, we will select Mukey. This is a five digit number that is assigned to each type of soil. Select Mukey from the list and click OK.

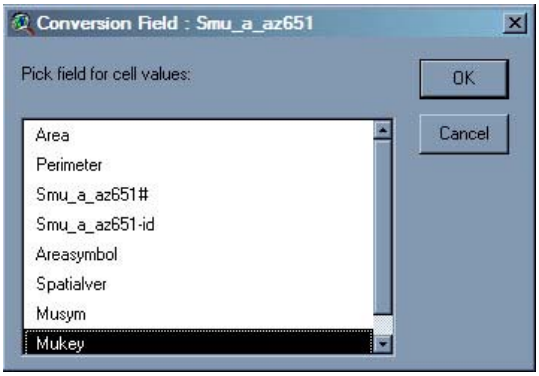


Figure 4-4: Select Conversion Field

6. Join Attributes to Grid? Click No. Add Theme to View? Click Yes.
7. Convert the soilsmap grid to an ASCII file by selecting File/Export Data. Choose ASCII Raster. Navigate to your StudyArea folder and save the file as soilsmap.asc.
8. The result is a new grid with the Mukey displayed. If you click on the  attribute table button on the toolbar, the table for the soils raster theme will appear. As you can see, the table has three columns: Value, Count, S_Value. The third column contains the Mukey you selected in step 4.

Attributes Of Soilsmap

Value	Count	S_value
5	4102	53315
6	8899	53385
18	101	53314
20	4892	53411
21	864	53393
23	522	53369
24	14159	53330
25	1598	53388
26	2608	53341
27	1251	53298
28	30694	53362
31	9866	53371
33	192	53303
34	461	53380
35	69630	53343
36	36	53354
37	662	53407
38	77	53401
39	412	53418
40	6511	53296
41	132	53363

Figure 4-5: Soilsmap Attribute Table

In the past, the conversion to a raster theme was easy and simple. Why is this not the case for the soils? When ArcView converts anything to a raster theme, it needs to place a number value in each cell. In the case of the DEM, it was the elevation of that cell. For the Land Cover Dataset, it was the value the USGS assign to the landuse of that cell. In both cases, a number value was used. Unfortunately, the Mukey is not a number; it is a string. They still look like numbers, so what's the difference? We don't see a difference, but ArcView does. When you look at a dinner bill, the numbers on the bill can be added up to get the total – these are numbers. When you look at phone numbers or addresses, you can't add these numbers together – they are strings. For the soils coverage, Mukey is recorded as a string, so ArcView must create a number to put in each cell instead. This is what makes this portion of the data preparation more difficult.

9. The attribute table is now the active window, so let's create the soilsmap.txt file. This is done the same way we created the landcov.txt file earlier. Select File/Export from the menu.
10. Choose Delimited Text and navigate to your StudyArea folder and save it as soilsmap.txt.

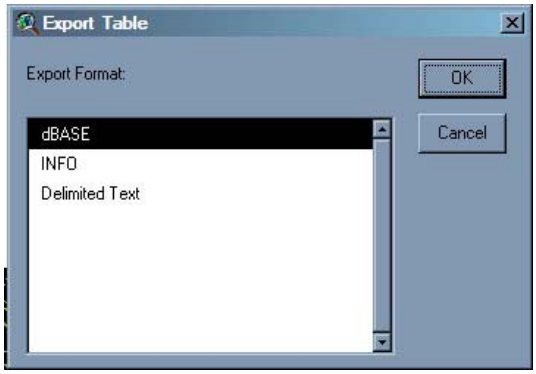


Figure 4-6: Export Delimited Text

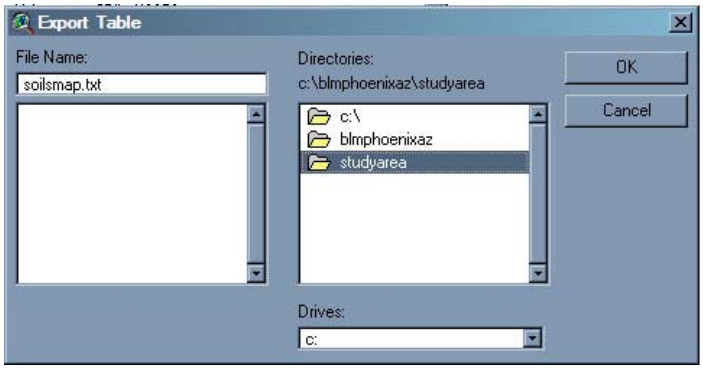


Figure 4-7: Save soilsmap.txt in StudyArea folder

11. Minimize ArcView and startup MS Excel. You will now open one of the files found in the tabular folder within you soils data folder. For my example, the folder is located in C:\BLMPhoenixAZ\soils\soil_az637\tabular. Navigate to this folder and change the Files of Type to All Files (*.*). Open the file mapunit.txt.

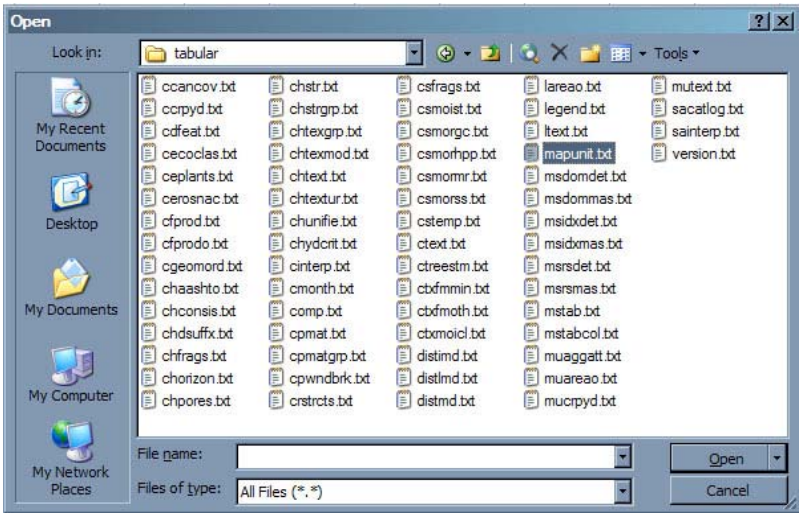


Figure 4-8: Open mapunit.txt in MS Excel

12. You will actually be importing a text file into a spreadsheet. Excel will do this for you with some help. In the first dialog window, Text Import Wizard, Delimited should already be selected. If it isn't, select it now. Click Next>.

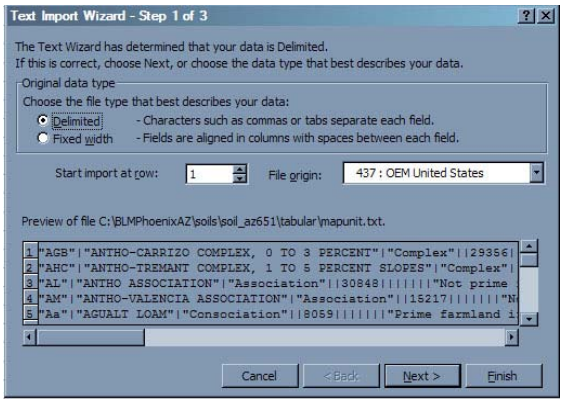


Figure 4-9: Text Import Wizard Step 1

13. The next wizard step will ask you how the columns should be delimited. Uncheck the box next to tab and check the box next to other. In the box next to other, enter the vertical slash | - the key above enter. Click Next>. Click Finish on the next window.

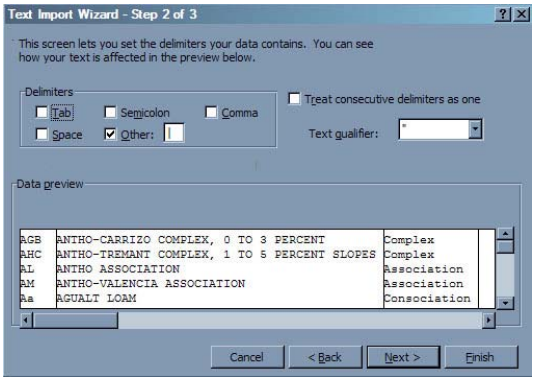


Figure 4-10: Text Import Wizard Step 2

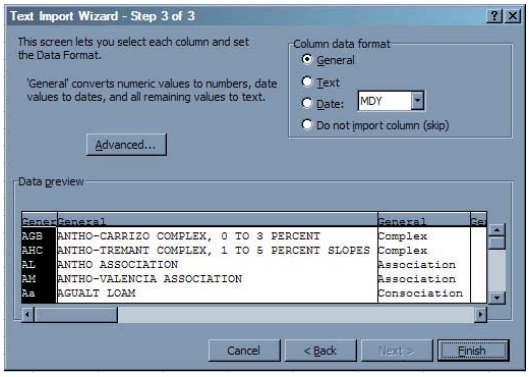


Figure 4-11: Text Import Wizard Step 3

14. The file has now been imported into Excel. Next, delete all the columns except the first, second and last ones.
15. Select File/SaveAs from the menu. Navigate to your StudyArea folder and save the new text file (Tab Delimited) as tempsoilsdb.txt. This file will come in handy if you plan to create a soilsdb.txt file later (see Advanced GeoWEPP Tools). A dialog window will appear asking about incompatibility issues, just click Yes.

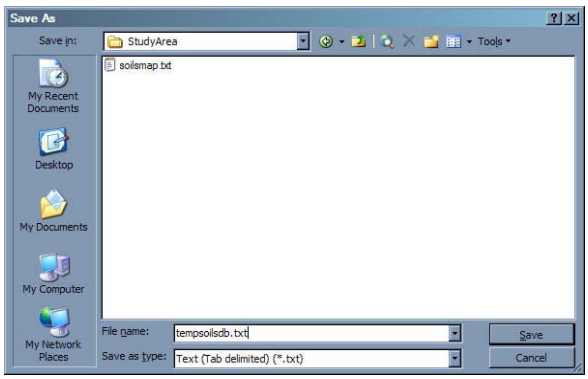


Figure 4-12: Save tempsoilsdb.txt in StudyArea Folder

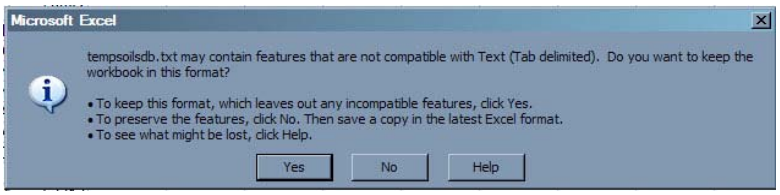


Figure 4-13: Compatibility Issues? Not really.

16. Now open soilsmap.txt and tempsoilsdb.txt, each in a different notepad window (to do this: double-click on the first file and then double click the second file OR open two notepads from the start menu).
17. With both windows open, you can now edit the soilsmap.txt. Soilsmap.txt will have the three columns you saw earlier. The tempsoilsdb.txt will have the three columns you saw in Excel (this file will be a little messy, so you can edit it by adding tabs to create actual columns). Look at the first number in the S_Value column. Find the same number in the third column of tempsoilsdb.txt. Copy the description in the second and replace the number in S_Value with it.

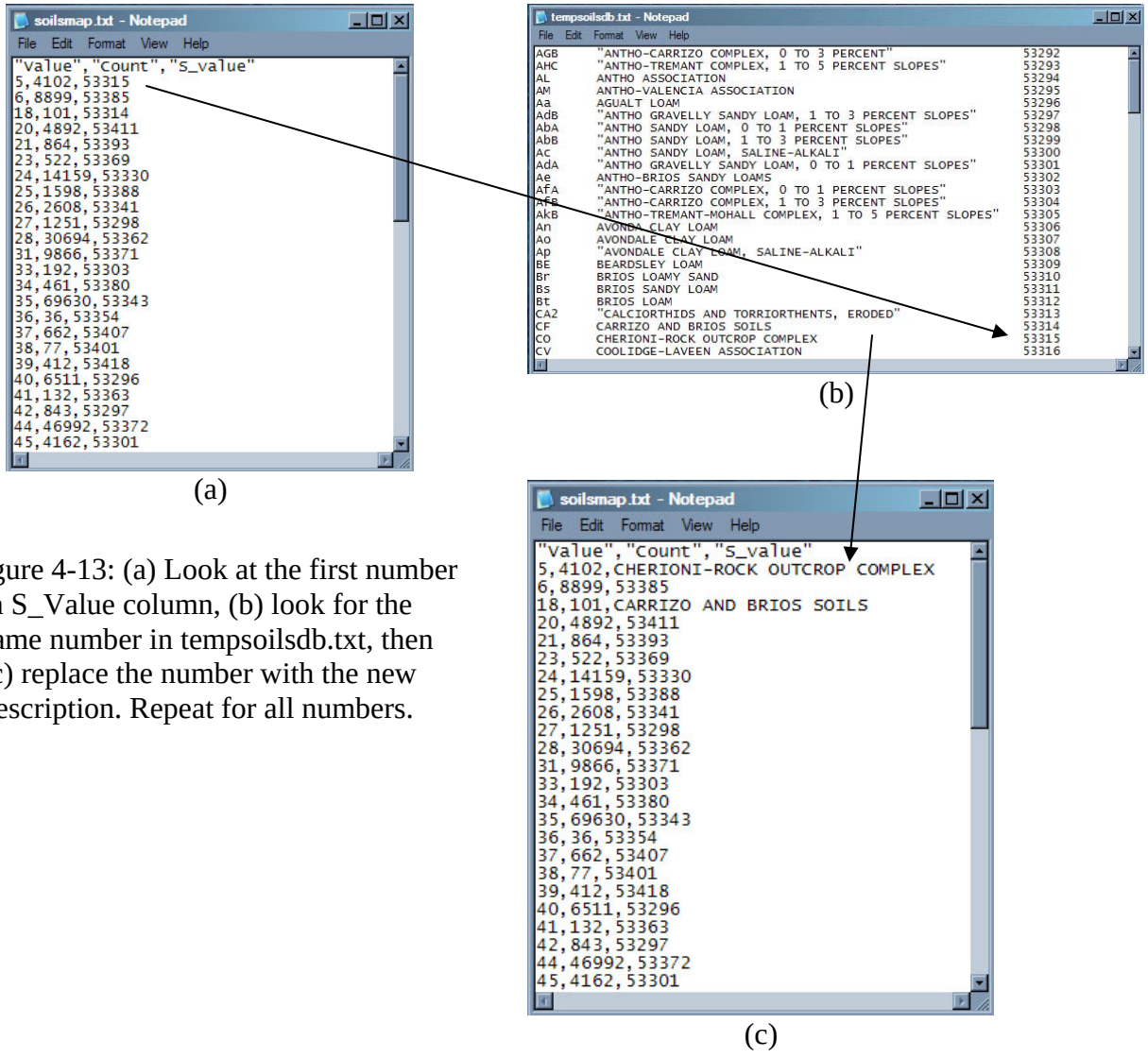


Figure 4-13: (a) Look at the first number in S_Value column, (b) look for the same number in tempsoilsdb.txt, then (c) replace the number with the new description. Repeat for all numbers.

18. Repeat step 17 for all the S_Value number in soilsmap.txt.
19. Save soilsmap.txt.
20. To create the soilsdb.txt file from tempsoilsdb.txt, just remove the first and third columns. Remove any quotes found at the beginning or end of the description. Add a vertical line | at the end of each description. Follow the steps in Advanced GeoWEPP Tools to find the WEPP database path and insert it after the matching soils description (after the |). Remember to put .sol at the end of each path. Save this file as soilsdb.txt in your StudyArea folder when finished.

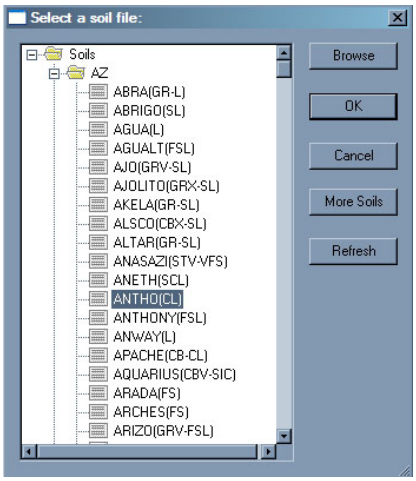


Figure 4-14: Finding the WEPP pathway

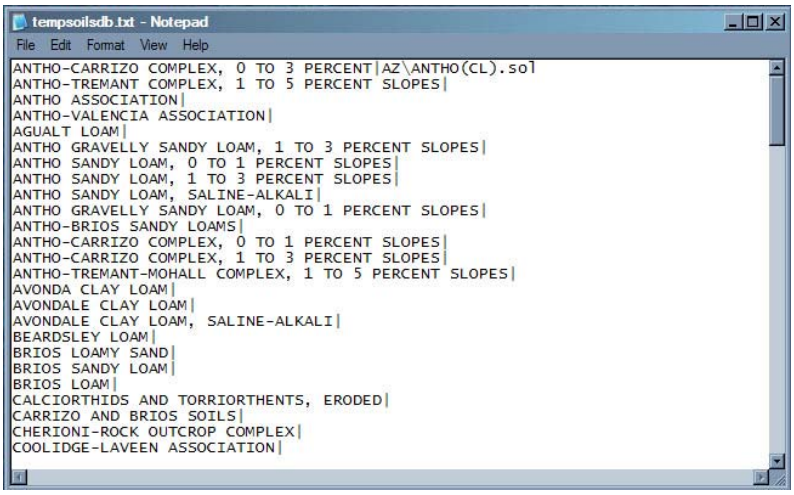


Figure 4-15: Modified tempsoilsdb.txt

You have now finished the easy version of the soils conversion process. The following section will guide you through the more complex steps if you have multiple soils themes.

Multiple Soils Layer Conversion (The hard way)

I mentioned previously that the reason why this conversion process is difficult is that ArcView does not "see" the Mukey as number but as a string. We will get around this problem by creating new tables and joining them together so that we can create raster themes with the Mukey as the value. By doing this, we will be able to merge multiple soils themes into one theme and not have any data conflicts. These steps combine many of the procedures we have already done and with the steps above. Reference those sections while going through these steps.

1. Add the soils layer by clicking either the Add Theme button on the toolbar or be selecting View/Add Theme from the menu.
2. When the Add Theme dialog box appears, change the Data Source Type to Feature Data Source. Navigate to the folder that contains the soils data. In my example, my soils data is located in C:\BLMPhoenixAZ/soils. With in this folder you will see a folder with a name beginning with "soil_". Open the first folder to reveal more folders. Open the spatial folder; several coverages will appear in the list box on the left. Click on the one that begins with "smu_" and then click OK.

3. Repeat Step 2 until all the coverages are loaded (each coverage is located in a different “soil_” folder).

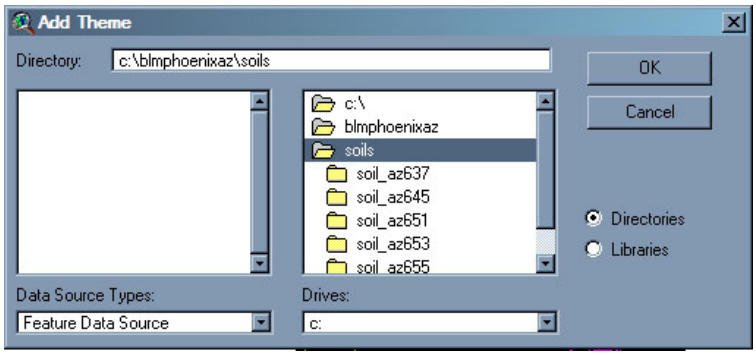
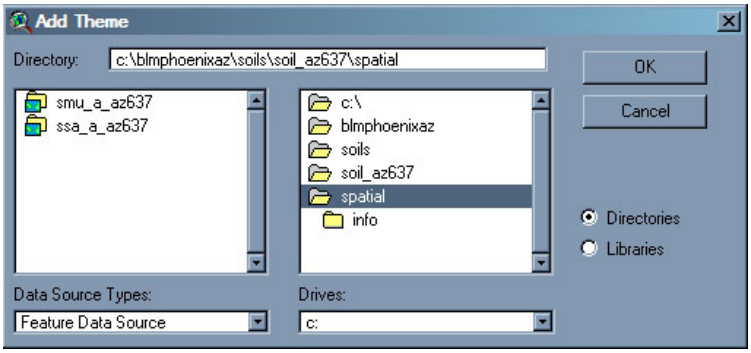


Figure 4-16: Multiple “Soil_” folders within soils data folder

Figure 4-17: Coverages located with spatial folder of “Soil_” folders



4. Before you go on. Verify that you need more than one coverage by using the same steps that were used in determining which DEMs and topo images were needed.

The following steps will need to be repeated for each soil coverage.

21. Minimize ArcView and startup MS Excel. You will now open one of the files found in the tabular folder within you soils data folder. For my example, the folder is located in C:\BLMPhoenixAZ\soils\soil_az637\tabular. Navigate to this folder and change the files type to all files. Open the file mapunit.txt.

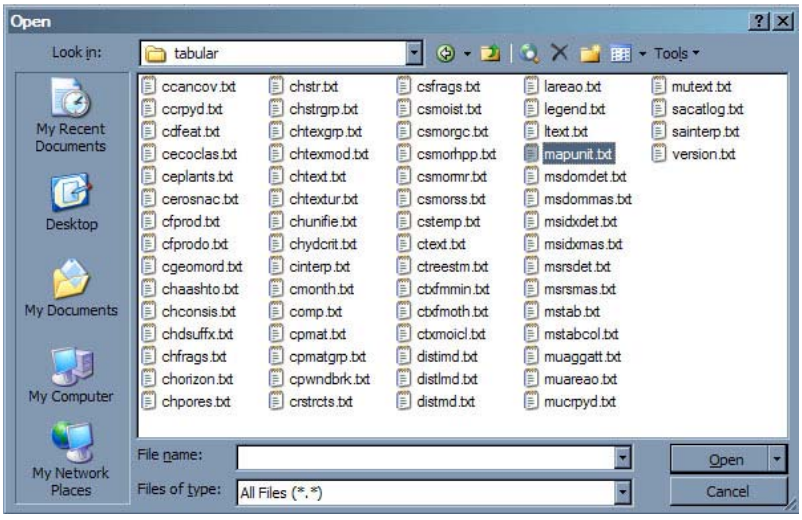


Figure 4-18: Open mapunit.txt in MS Excel

22. You will actually be importing a text file into a spreadsheet. Excel will di this for you with some help. In the first dialog window, Text Import Wizard, Delimited should already be selected. If it isn't, select it now. Click Next>.

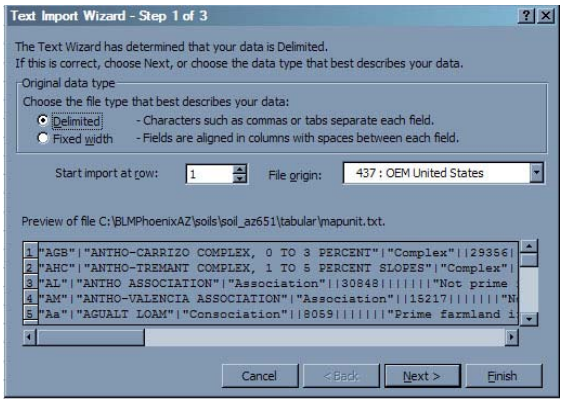


Figure 4-19: Text Import Wizard Step 1

23. The next wizard step will ask you how the columns should be delimited. Uncheck the box next to tab and check the box next to other. In the box next to other, enter the vertical slash | - the key above enter. Click Next>. Click Finish on the next window.

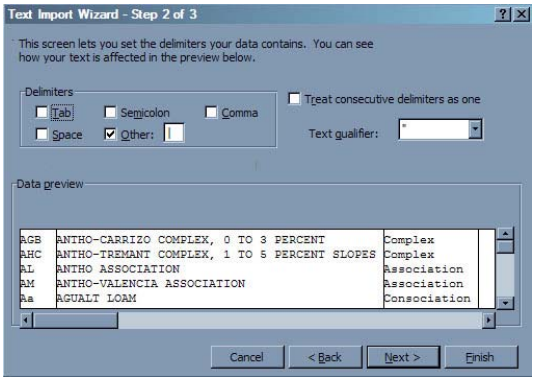


Figure 4-20: Text Import Wizard Step 2

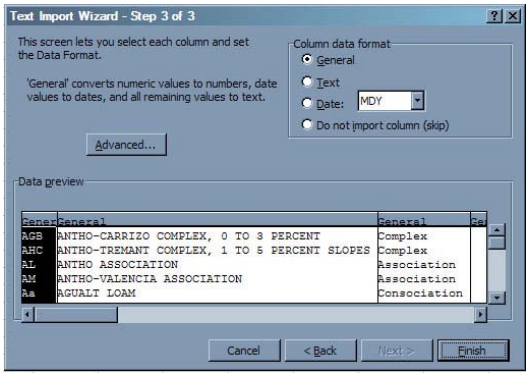


Figure 4-21: Text Import Wizard Step 3

24. The file has now been imported into Excel. Next, delete all the columns except the first, second and last ones.
25. Select File/SaveAs from the menu. Navigate to your StudyArea folder and save the new text file (Tab Delimited) as tempsoilsdb.txt. This file will come in handy if you plan to create a soilsdb.txt file later (see Advanced GeoWEPP Tools). A dialog window will appear asking about incompatibility issues, just click Yes.

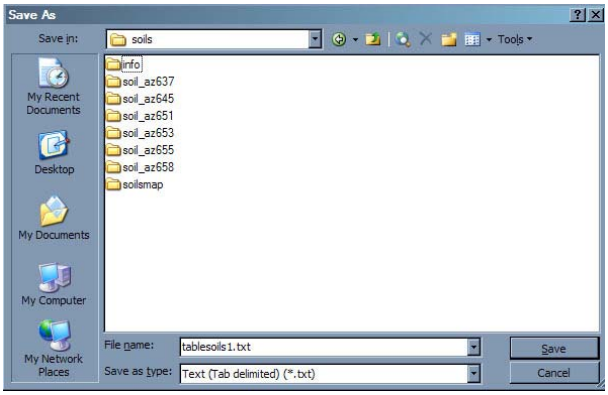


Figure 4-22: Save tablesoils1.txt in StudyArea Folder

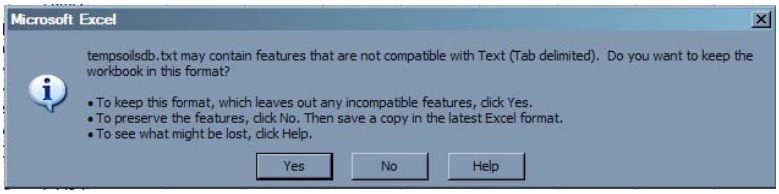


Figure 4-23: Compatibility Issues? Not really.

5. Open soilstable1.txt in notepad. You will need to enter column headings. Add the following:

   Musym Description Mu_Num

   Type in the first word, then hit tab. Type the second word, then hit tab. Type in the last word. Save file and exit.

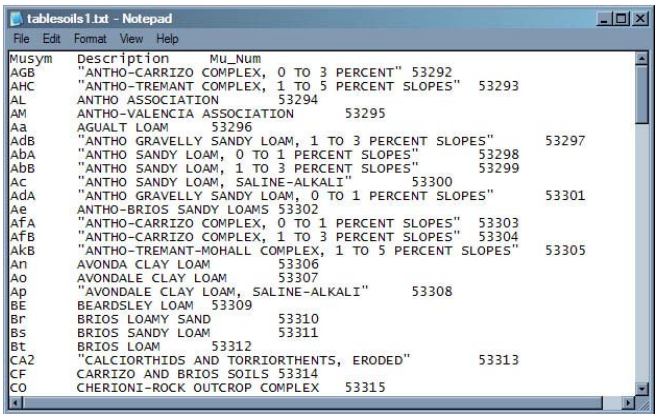
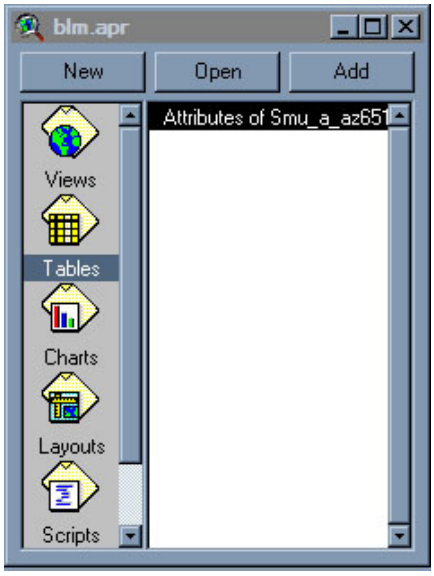
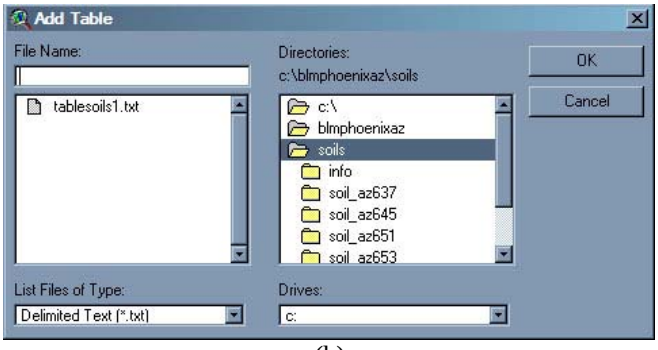


Figure 4-24: Modified tablesoils1.txt

6. Maximize ArcView. Make sure the first soil theme is active and then click  the attribute table icon. In the Project dialog box, click on the table icon and then click add. Navigate to the soils folder. Change the List Files of Type to "Delimited Text (*.txt)". Click on soilstable1.txt and then click OK.



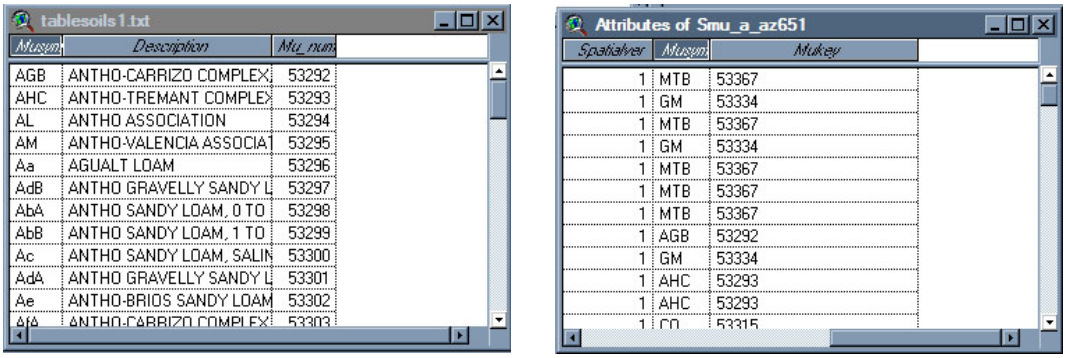
(a)



(b)

Figure 4-25: (a) Project Window; (b) add new table From tablesoils1.txt file

7. A new table should appear in ArcView. Click the heading “Musym”; the box should change (darker background with white text, for example – may be different depending on your window settings). Repeat this for the first soils attribute table.



(a) (b)

Figure 4-26: (a) New table, tablesoils1.txt; (b) soil attribute table

8. Now, click the Join Tables button  on the toolbar. This will join soilstable1 and the first soils attribute table together.

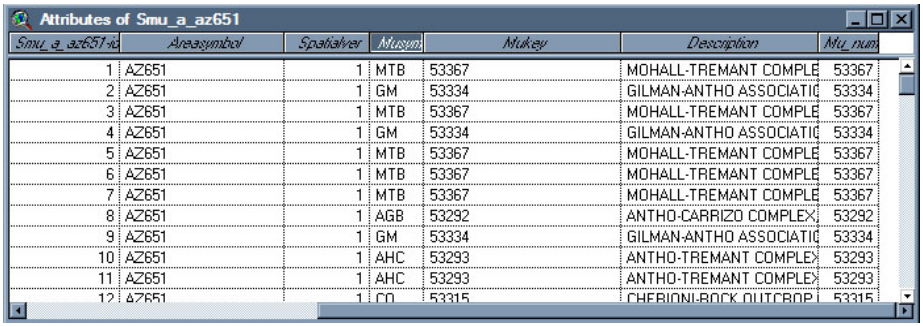


Figure 4-27: The resulting joined attribute table

9. Next we will convert the coverage to a grid. During this conversion process, the resulting grid may be clipped from the mask for you without any extra steps. In the Land Cover conversion section, we change the Analysis Properties so that the resulting grid from the land cover image would be clipped. If you have not restarted ArcView, this change will still be in place, so when you convert the soils coverage to a grid, the resulting grid will already be clipped. If you have restarted or have nor made these changes, do it know by following the steps in the Land Cover conversion section.
10. Now to convert the coverage to a raster. Maximize View1. Select Theme/Convert to Grid from the menu. Navigate to the soils data folder and choose a name (like soils1). Click OK.

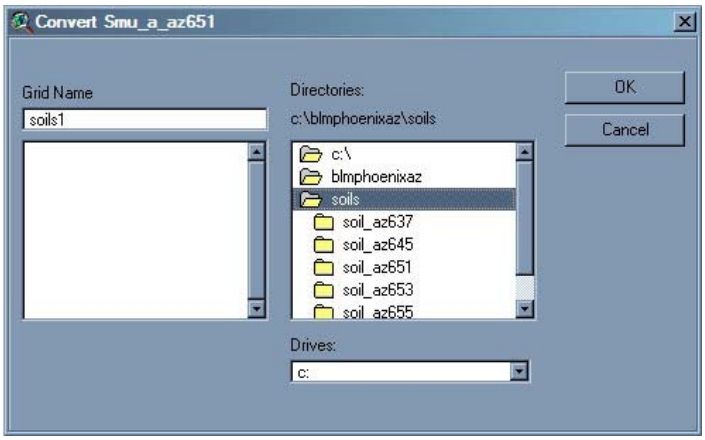


Figure 4-28: Convert soil coverage to soils1 grid

11. Next, you will need to choose which attribute that each raster cell will contain. We need to select the attribute that contains a unique value for each type of soil in the coverage. In this case, we will select Mu_Num. This is a five digit number that is assigned to each type of soil. Select Mu_Num from the list and click OK.

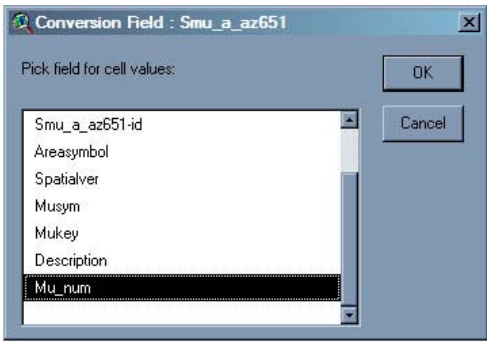


Figure 4-29: Select Mu_Num as the conversion field

12. Add Theme to View? Click Yes.
13. Repeat steps 5 through 17 for the remaining soil coverages, naming each table and grid something different (like soilstable2.txt and soils2, soilstable3.txt and soils3, etc.)

Once all the coverages have been converted, you will need to merge all the soil grids into one grid. This is done the same way the mask was created and how the DEMs were merged, just with a few minor changes. Save the resulting grid in the soils folder as soilsmap. The script changes should look like this:

```
theView=av.GetProject.FindDoc("view1")

grid1 = theView.findtheme("soils1").getgrid
grid2 = theView.findtheme("soils2").getgrid
‘grid3 = theView.findtheme("soils3").getgrid
‘grid4 = theView.findtheme("soils4").getgrid

theGridList = {grid1, grid2}
‘theGridList = {grid1, grid2, grid3, grid4}
outGrid = grid1.Merge(theGridList)

  dem = GTheme.Make(outgrid)
  theView.AddTheme(dem)
```

14. Save the soilsmap grid as soilsmap.asc in your StudyArea folder.

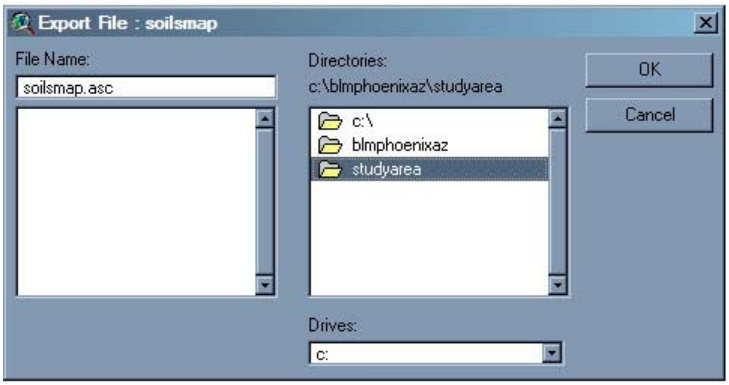


Figure 4-30: Save soilsmap grid as soilsmap.asc in StudyArea folder

15. Click the Attribute Table button  to open the attribute table for soilsmap. Select File/Export and export this table as a Delimited Text file. Navigate to the StudyArea folder and save the text file as soilsmap.txt.

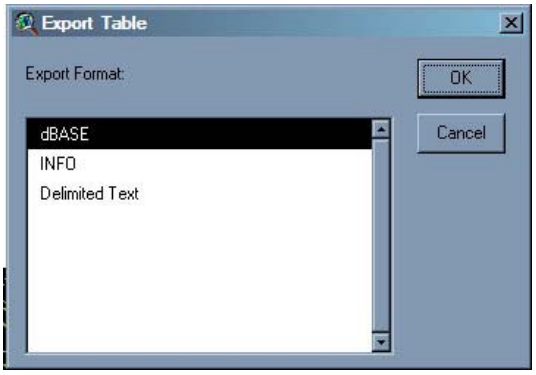


Figure 4-31: Export Delimited Text

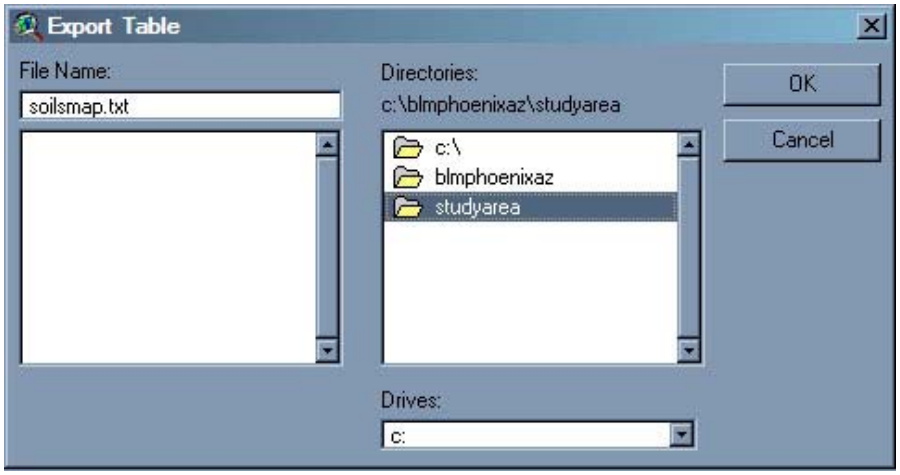


Figure 4-32: Save soilsmap.txt in StudyArea folder

16. Now open soilsmap.txt and tablesoils1.txt, each in a different notepad window (to do this: double-click on the first file and then double click the second file OR open two notepads from the start menu).
17. With both windows open, you can now edit the soilsmap.txt. Soilsmap.txt will have the two columns: Value and Count. The tablesoils1.txt will have the three columns you saw in Excel plus the column headings you entered earlier (this file will be a little mess, so you can edit it by adding tabs to create actual columns). Put a comma at the end of each line (not including the column headings) in soilsmap.txt. Look at the first number in the Value column. Find the same number in the third column of tablesoils1.txt. Copy the description in the second column of tablesoils.txt and paste it after the comma on the corresponding line in soilsmap.txt.

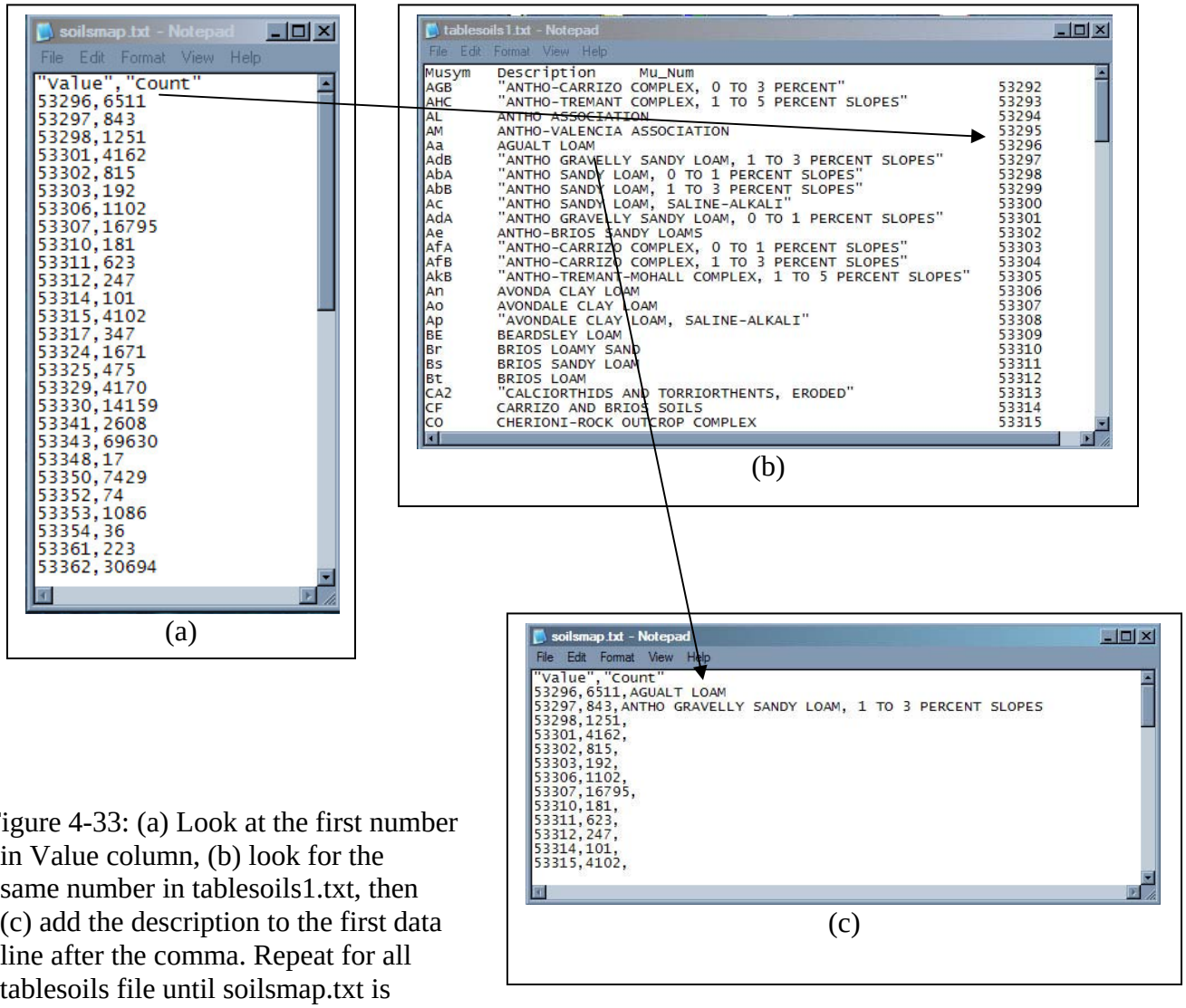


Figure 4-33: (a) Look at the first number in Value column, (b) look for the same number in tablesoils1.txt, then (c) add the description to the first data line after the comma. Repeat for all tablesoils file until soilsmap.txt is complete.

18. Repeat step 16 for all the Value numbers in soilsmap.txt.
19. Repeat steps 16 through 18 for the remaining tablesoils text file.
20. Save soilsmap.txt.
21. To create the soilsdb.txt file, save the current soilsmap.txt file as soilsdb.txt. Delete everything except for the descriptions. Remove any quotes found at the beginning or end of the descriptions. Add a vertical line | at the end of each description. Follow the steps in Advanced GeoWEPP Tools to find the WEPP database path and insert it after the matching soils description (after the |). Remember to put .sol at the end of each path. Save this file as soilsdb.txt when finished.

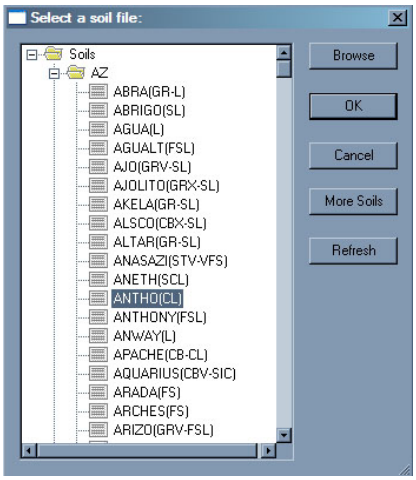


Figure 4-34: Finding the WEPP pathway

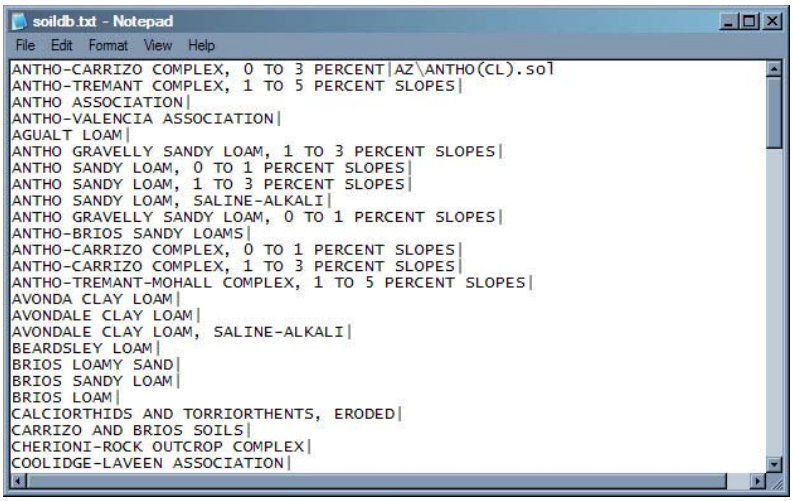


Figure 4-35: Modifying soilsdb.txt

You have now completed the soil data preparation steps. All the data preparation is finished and you can now use you data in GeoWEPP. For information of how to use GeoWEPP, consult the tutorials.

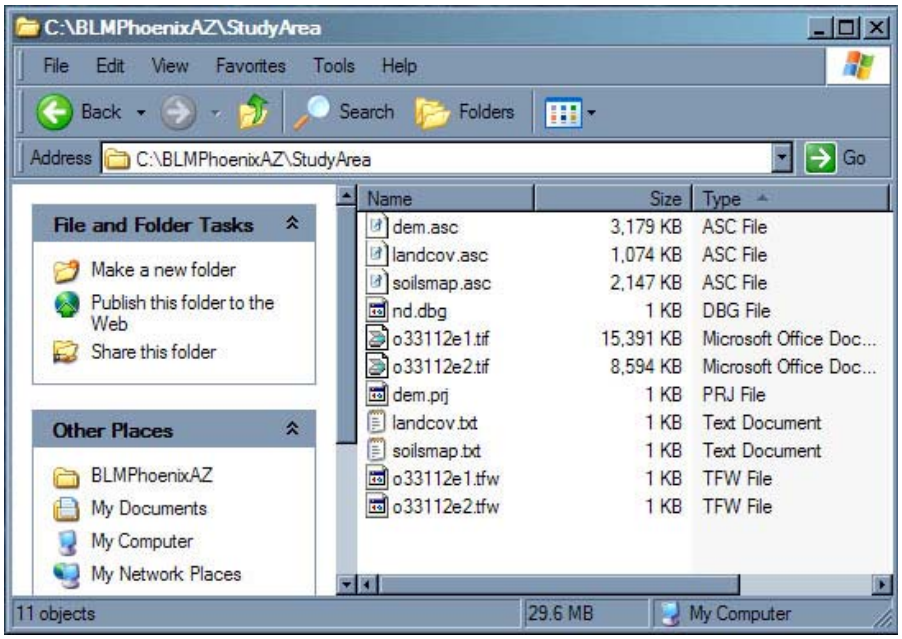


Figure 4-36: All the prepared data in GeoWEPP accepted format

5. Concluding Comments

Here are some bits of advice and some advanced suggests for making you data preparation easier and faster. Some of these suggestions are meant for more advanced users of ArcView. If you are not up to this level of work, this manual and Advanced GeoWEPP Tools will be able to guide you through all the steps you need to complete your data preparation.

Finished for the Day But Not for the Data Set?

If it has come to the end of the day and you are not finished with your data set preparation, save the project you are working on by selecting File/Save Project. Navigate to where all the data you are working with is store (C:\BLMPhoenixAZ in my example). Choose a name and save the project. When you start ArcView again to complete the preparation, choose Open Existing Project and select this project. All the work you did will be saved and ready to go.

Save Time Next Time

The steps in this manual include the creation of a few scripts. If you only need to process your data once or twice, you can copy the scripts in this manual each time you needed them. But, if you are going to process many data sets, it may be wise to create a new project, then create the scripts, and finally save this project as dataprepare.apr. Now, whenever you need to convert data, just open the dataprepare.apr project and the scripts will be there for you each time – just don't save over this project.

You Forgot to Save the File in the Correct Folder?

The procedures in this manual include saving the needed files into a single folder. The purpose of this is to make loading the data into GeoWEPP easier for you. If you saved the files in different folders, you would have to hunt them down during the loading process. If you followed the steps outlined in this manual, you StudyArea folder should contain:

dem.asc	DEM ASCII
dem.prj	DEM Projection File
TopoImage.tif	Topographic Image File
TopoImage.tfw	TFW File for Topo Image
landcov.asc	Land Cover ASCII
landcov.txt	Land Cover Key and Description File
soilsmap.asc	Soils Map ASCII
soilsmap.txt	Soils Map Key and Description File

If you do not have some of these files in the folder, you may have to search for them. When you find them, just copy and paste or move the files into this folder.

Loading Data into GeoWEPP

You have completed the preprocessing steps needed to get you data from its source into GeoWEPP compatible form, but what is the easiest way to make sure all your data is put into GeoWEPP? Presently, the best way is to use the "Use own GIS data in ASCII format" button in GeoWEPP. GeoWEPP will ask you to create a directory in

which all the project data will be placed. This directory is different from the folder you used for the steps in this manual. You should definitely use a different folder just in case something goes wrong and to prevent any unexpected modifications to a file.

Once the directory has been created, GeoWEPP will ask you to copy all the ASCII files over. It is best just to select all the files from your data directory and let GeoWEPP load and copy the files it needs. To do this, navigate to you data folder, click the first file in the list, hold down the shift key and press the arrow key until you reach the last file. All the files should be highlighted in blue. Click OK and GeoWEPP will load and copy the files in needs; this includes the landcov.txt, soilsmap.txt, landusedb.txt (if created), and soilsdb.txt (if created). It will not load the topo images. GeoWEPP will convert the DEM and created the hillshade. It will also convert the landcov.asc and soilsmap.asc back into grids (rasters) and will then ask you if you want to load any topo image. Select each image one at a time since GeoWEPP will make the image more transparent. If you select them all at once, you will have one transparent image and the remaining images as normal.

Once you have loaded all the topo images, GeoWEPP will run TOPAZ and determine the initial channel structure for you. Now you can continue on with GeoWEPP.

More Advanced Techniques

We used some more advanced GIS techniques when we converted multiple soil themes to create the soilsmap.asc file. You can use similar techniques to add the descriptions for landuse and soils to the landcov.txt and soilsmap.txt files. You will still need to modify the format afterwards to match the one in Advanced GeoWEPP Tools. This is a benefit is you are using a different landuse system that the USGS classification. To do this, you will need to create a text file that contains one column with the values that match the values in the land cover theme or the soils theme. Next you will need to add the descriptions that correspond to the value column. Finally you need to add the column headings. Save the file; choose a name that you'll remember (like soilslist.txt or landusedescribe.txt). An example of what this file may look like is below:

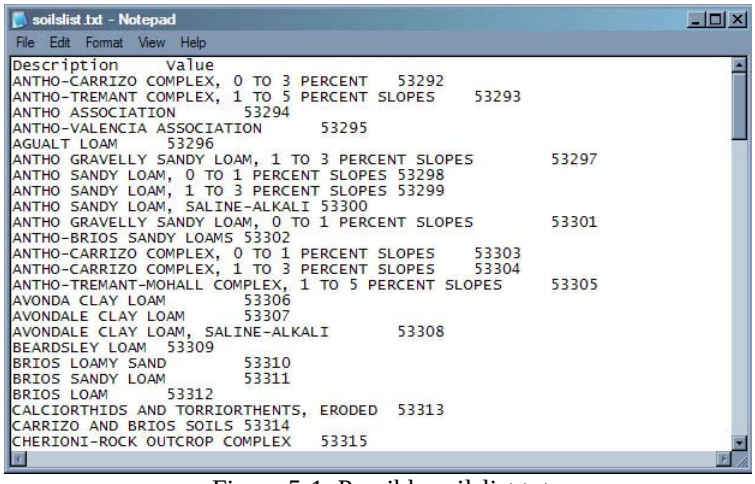


Figure 5-1: Possible soilslist.txt

This file was compiled by gathering all the unique Mukey numbers and soil descriptions from each mapunit.txt file of each soil layer (similar to what was done in the hard soil

conversion process). I opened each file in Excel as a different workbook. I then removed all columns except for the second (descriptions) and the last (Mukey). I copied and pasted this information into one workbook and sorted all the data (Data/Sort from the menu) based on the last column (Mukey). I then deleted any redundant rows. The result was a list of all the soils from the soil data folder. I saved this file as soilslist.txt. I added column headings (Description Value) to the soilslist.txt file in notepad, removed any quotes, and save it again. In ArcView, I added a new table based on soilslist.txt (see Mulitple Soil Preparation). I selected the value column from soilslist table and then vaue from the new merged soils raster theme (the one I would convert to an ASCII file). I then joined the two tables and exported (File/Export) the new table. I saved it as soilsmap.txt. This file is now in the format descriped in Advanced GeoWEPP Tools. A similar process can be done with the landcov.txt file if you are using data other than the Land Cover dataset.

As you have seen, the steps we used in the manual use ArcView to process the information. Many of the steps can be reduced or eliminated if you use ArcGIS Tools. If you are more familiar with ArcGIS, then use that instead. You only need the files in the final formats describe in this manual. How you get them is up to you.

6. Appendix

Scripts used in this Manual

Below are all the scripts that are used in this manual. They are all based on the same script and have been modifies to fit the need.

```
theView=av.GetProject.FindDoc("view1")


grid1 = theView.findtheme("topo1").getgrid
grid2 = theView.findtheme("topo2").getgrid
'grid3 = theView.findtheme("topo3").getgrid
'grid4 = theView.findtheme("topo4").getgrid

theGridList = {grid1, grid2}
'theGridList = {grid1, grid2, grid3, grid4}
outGrid = grid1.Merge(theGridList)

  topo = GTheme.Make(outgrid)
  theView.AddTheme(topo)
```

Script 1 – Merging Topographic Images

This script is used to merge two or more topo images to create a Mask. The Mask will be used later to define the study area. By doing this, you will reduce the size of the data set you will be working with. This will also reduce the size of the area you will see in GeoWEPP.

```
theView=av.GetProject.FindDoc("view1")


grid1 = theView.findtheme("dem1").getgrid
grid2 = theView.findtheme("dem2").getgrid
'grid3 = theView.findtheme("dem3").getgrid
'grid4 = theView.findtheme("dem4").getgrid

theGridList = {grid1, grid2}
'theGridList = {grid1, grid2, grid3, grid4}
outGrid = grid1.Merge(theGridList)

  dem = GTheme.Make(outgrid)
  theView.AddTheme(dem)
```

Script 2 – Merging Multiple DEMs

This script is used to merge multiple DEMs. Sometimes your intended study area will overlap multiple DEMs. Since GeoWEPP can only "see" one DEM layer, you will need to merge all your DEMs into one theme. From here, you will be able to use the Mask to trim away the excess information. The result will be a DEM the size of the Mask.

```
theView=av.GetProject.FindDoc("view1")


grid1 = theView.findtheme("soils1").getgrid
grid2 = theView.findtheme("soils2").getgrid
'grid3 = theView.findtheme("soils3").getgrid
'grid4 = theView.findtheme("soil4").getgrid

theGridList = {grid1, grid2}
'theGridList = {grid1, grid2, grid3, grid4}
outGrid = grid1.Merge(theGridList)

 soils = GTheme.Make(outgrid)
  theView.AddTheme(soils)
```

Script 3 – Merging Multiple Soil Grids

This script will merge the soils grids that were created from multiple soil coverages. Like with DEMs, your study area may cross multiple soil coverage. The process to prepare such data is complex, but you will need to merge the resulting grids before you can finish this process. The result will be one grid that covers your study area.

Images from Preparation of Example Data

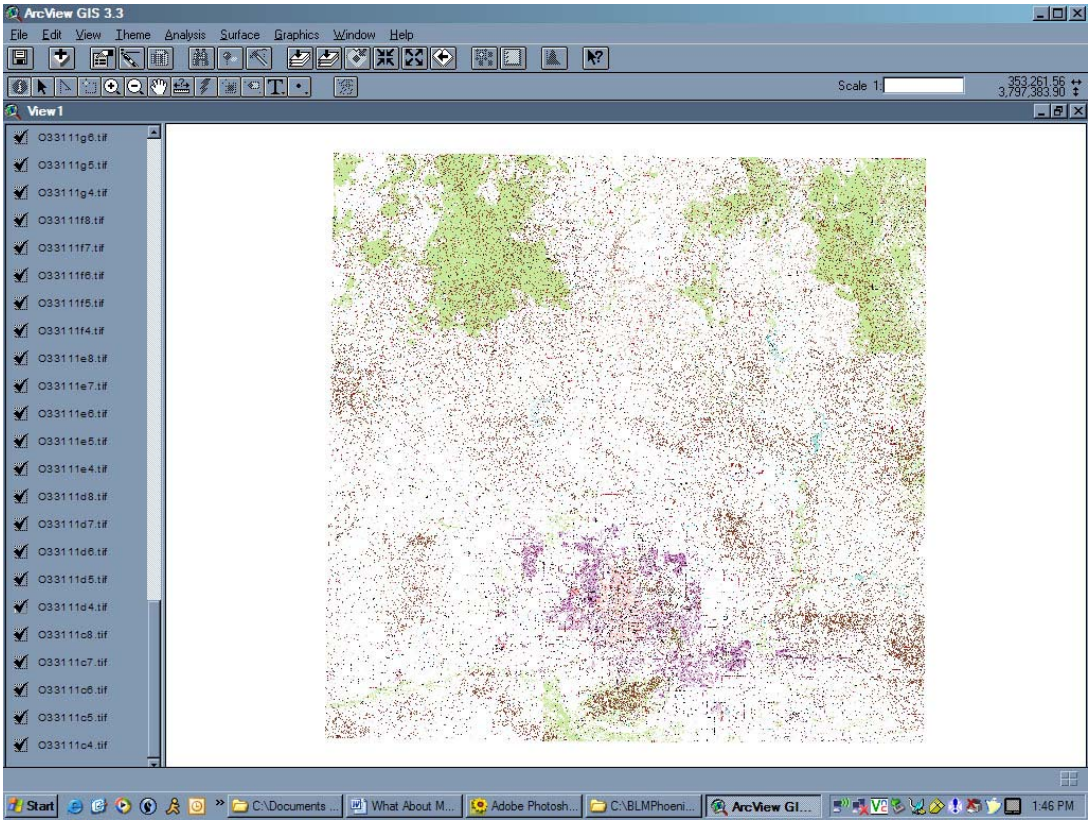


Figure A-1: All 99 Topographic Images. Where id my study area?

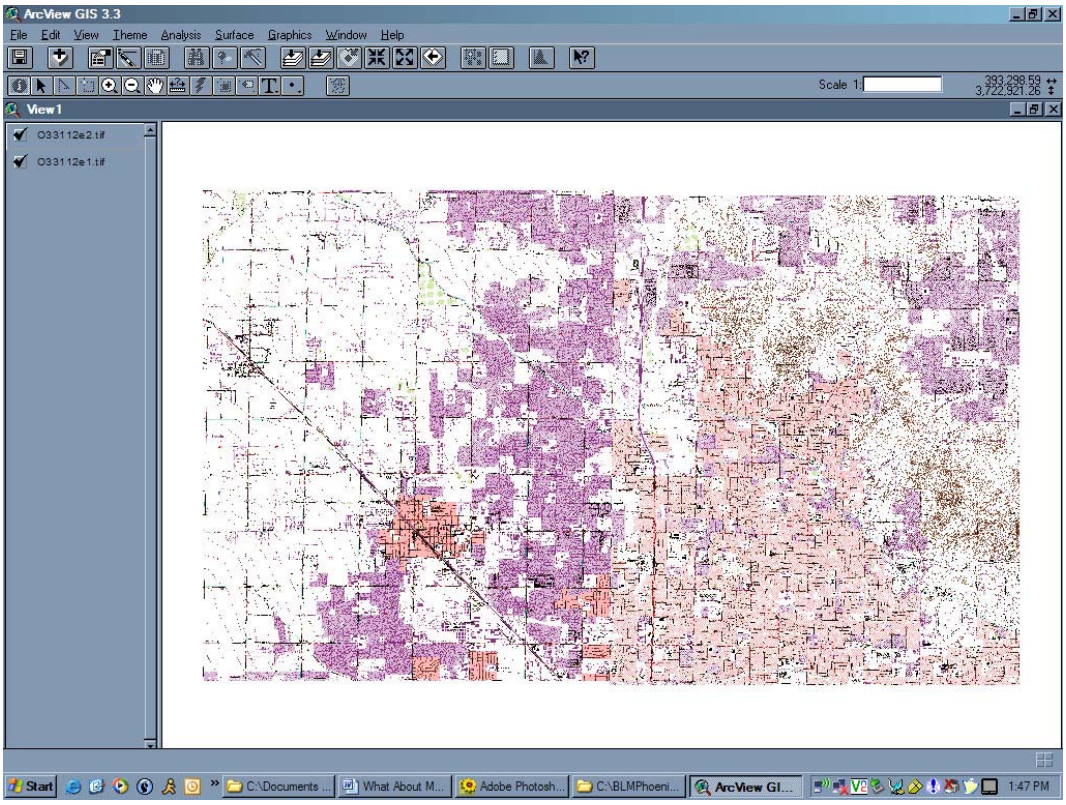


Figure A-1: Study area intersects two topo images. Need to create Mask

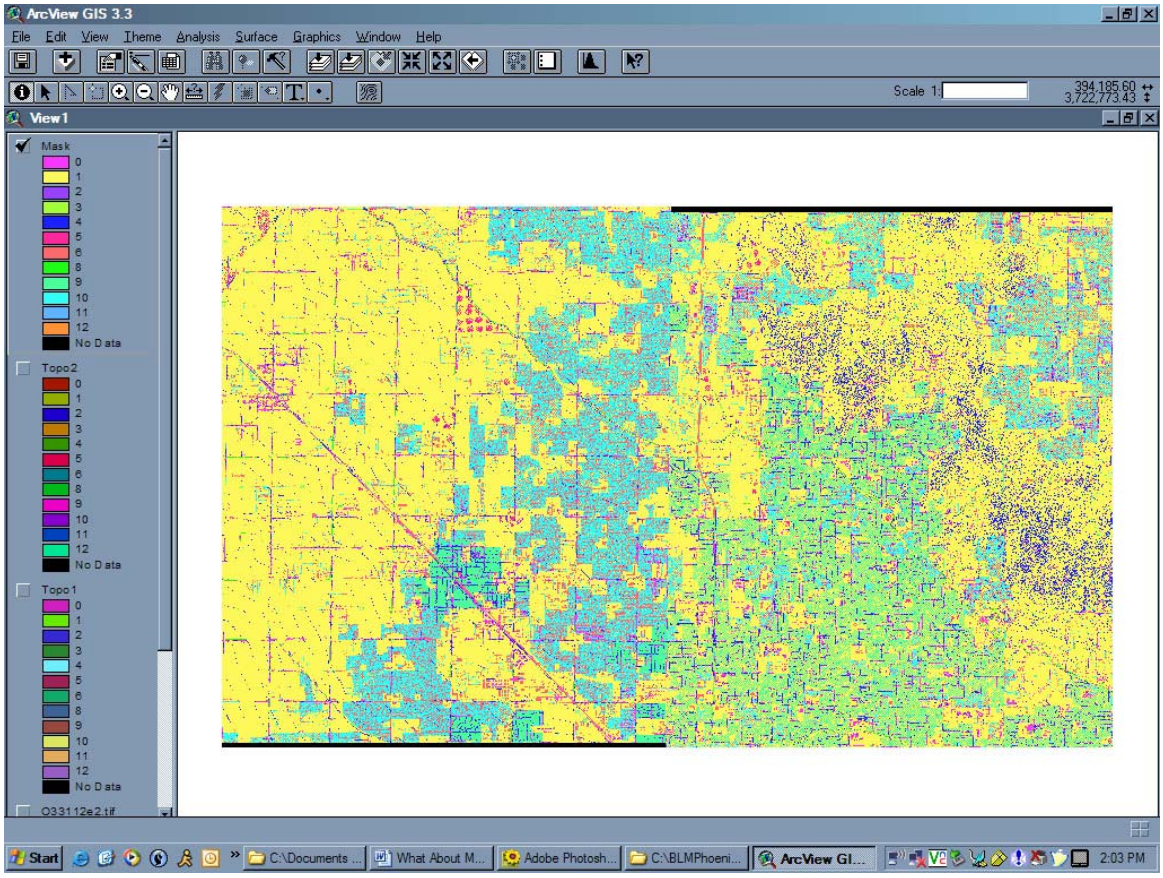


Figure A-3: The Mask created from the two topo images (Figure A-2)

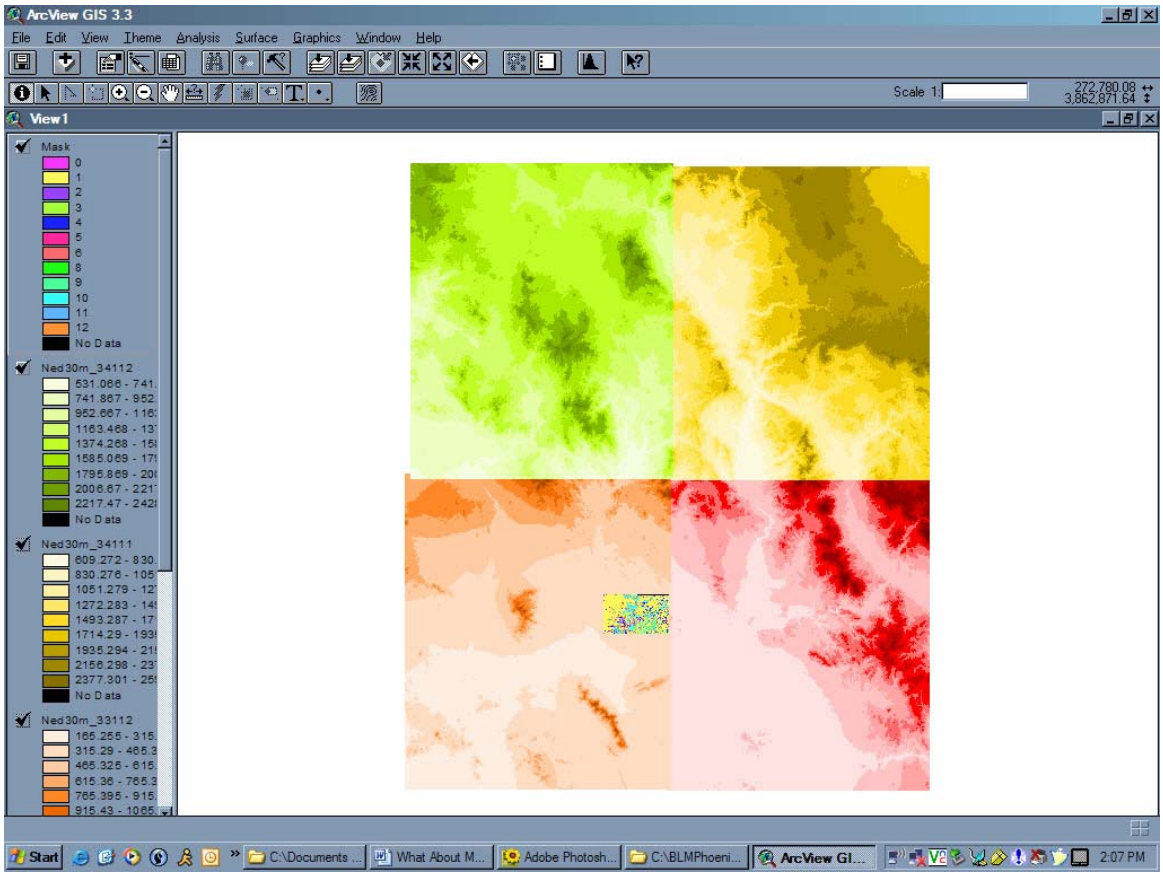


Figure A-4: All four DEMs loaded. Mask also present.

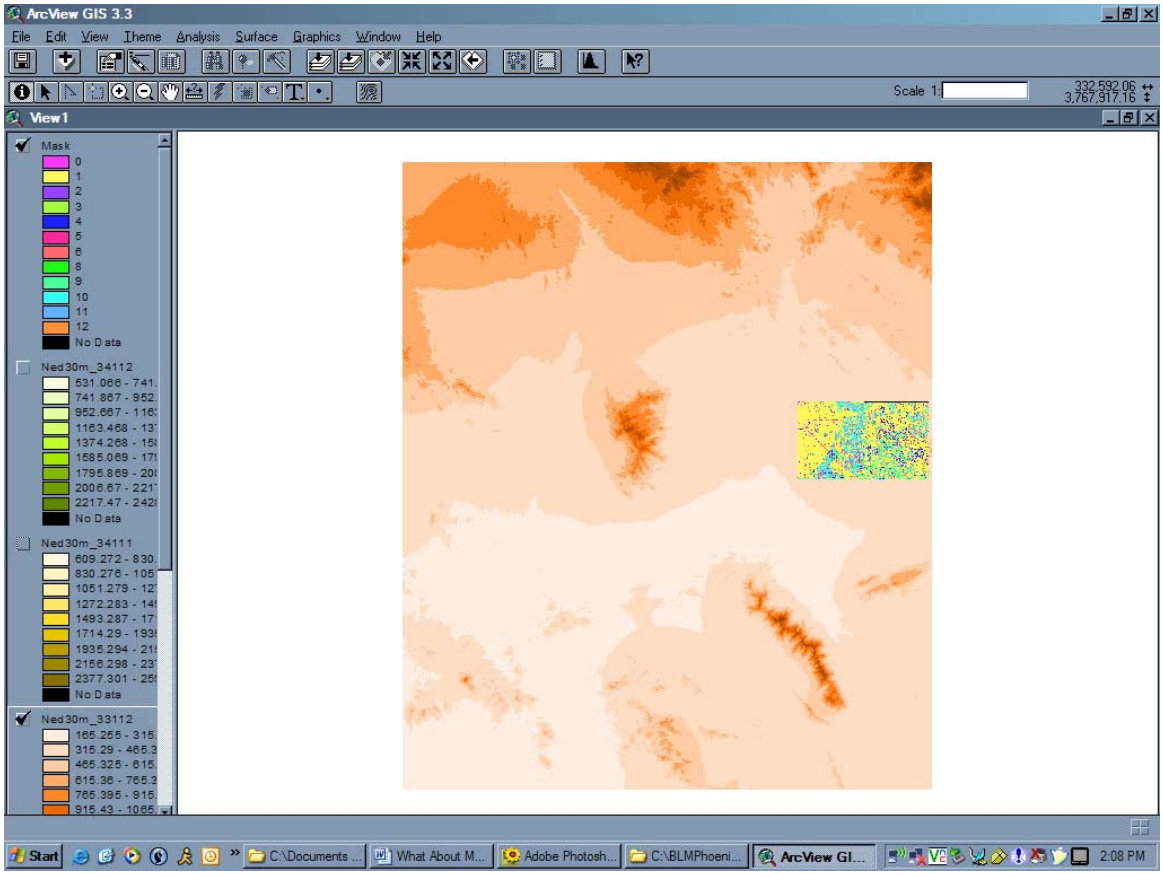


Figure A-5: Study area in only located in one DEM. No need to merge the four DEMs (Figure A-4)

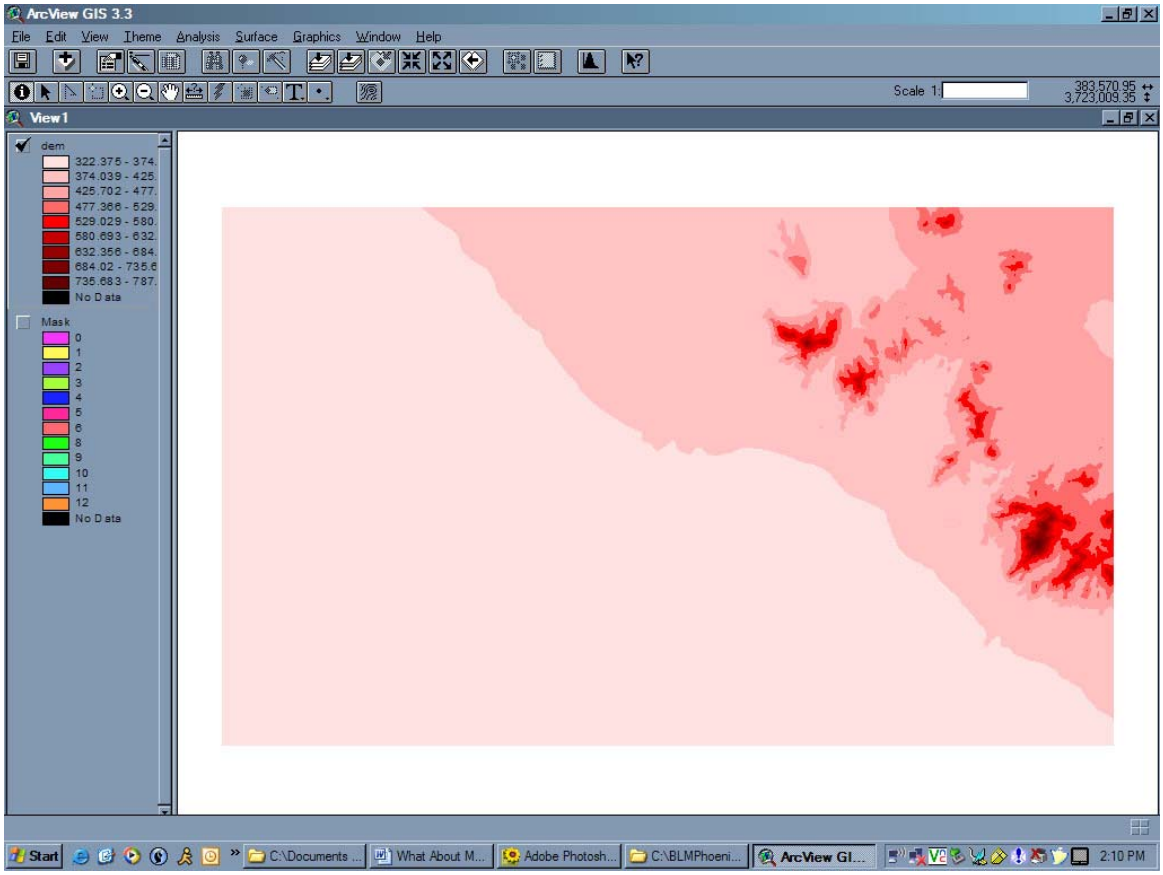


Figure A-6: The final clipped DEM for the study area. This will be converted to dem.asc

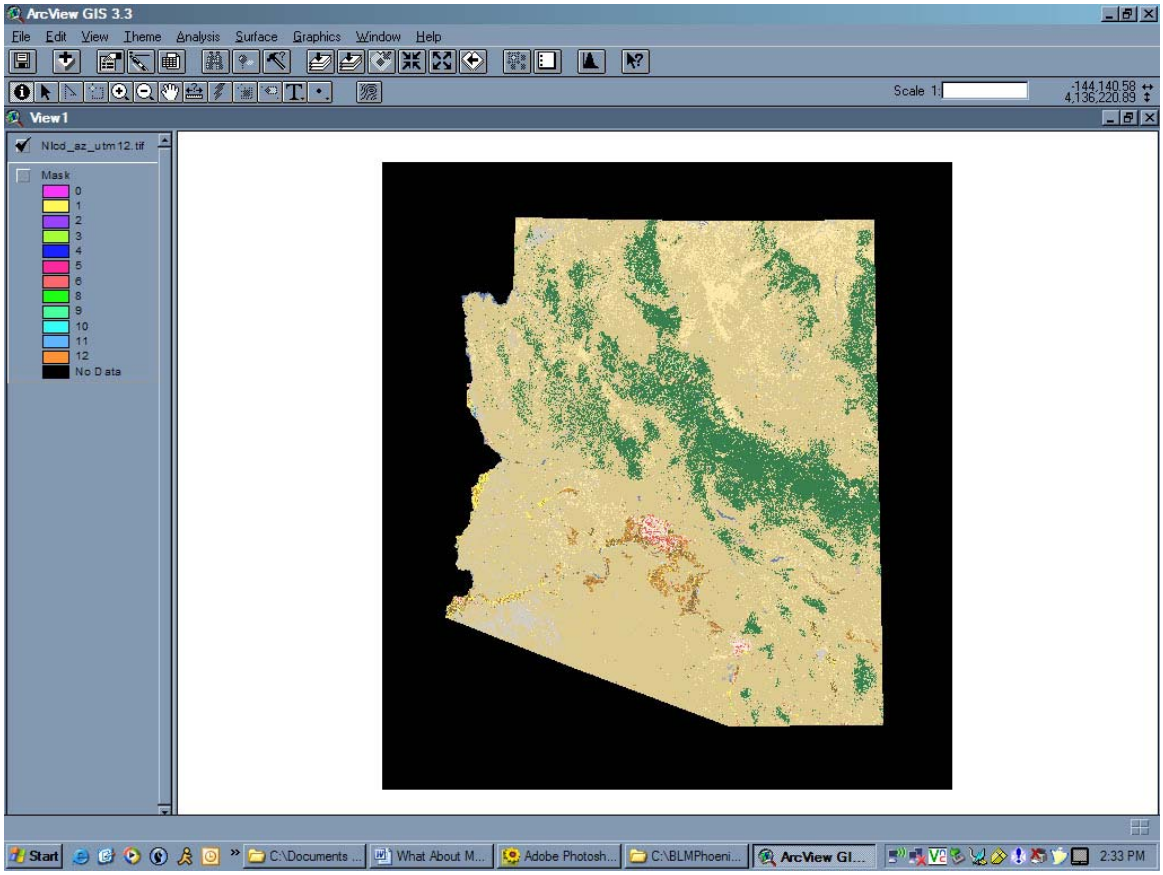


Figure A-7: The Land Cover Dataset for Arizona, in image format (.tif)

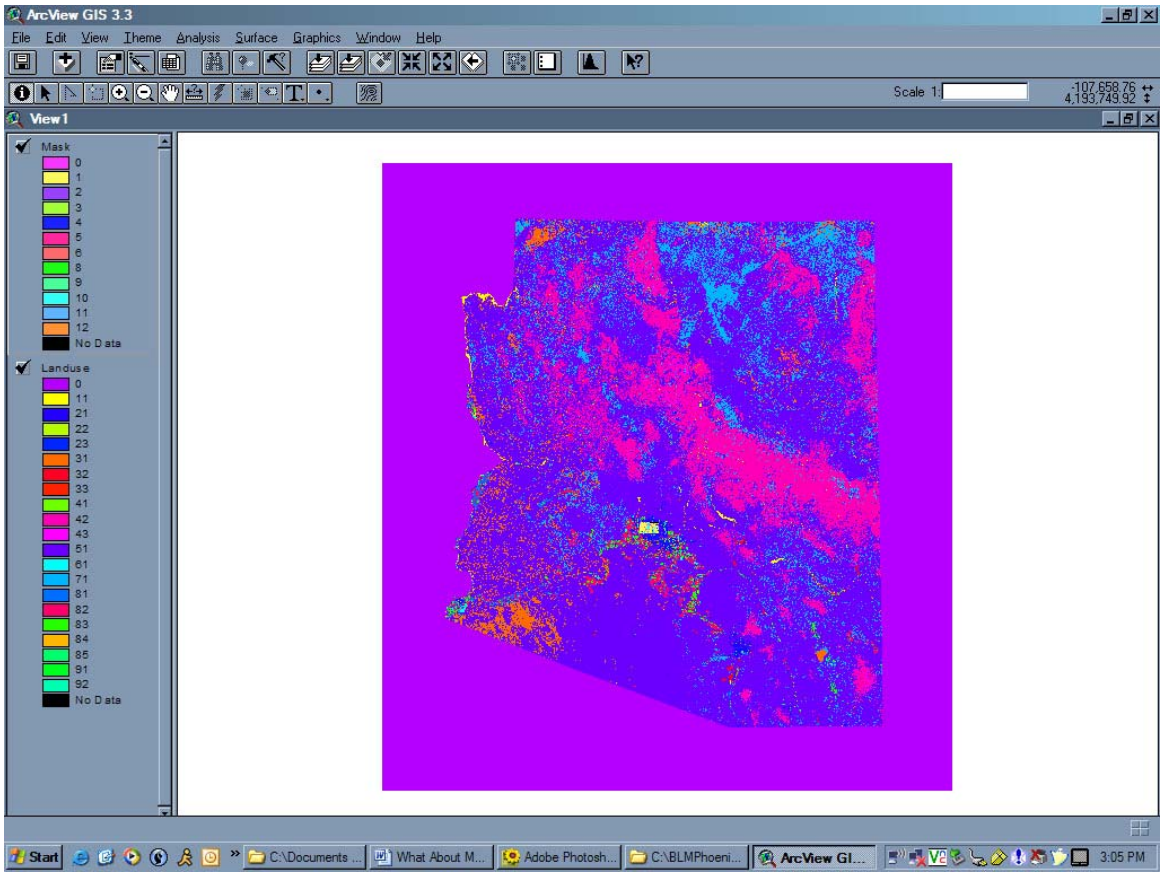


Figure A-8: The Arizona Land Cover Dataset converted to a grid

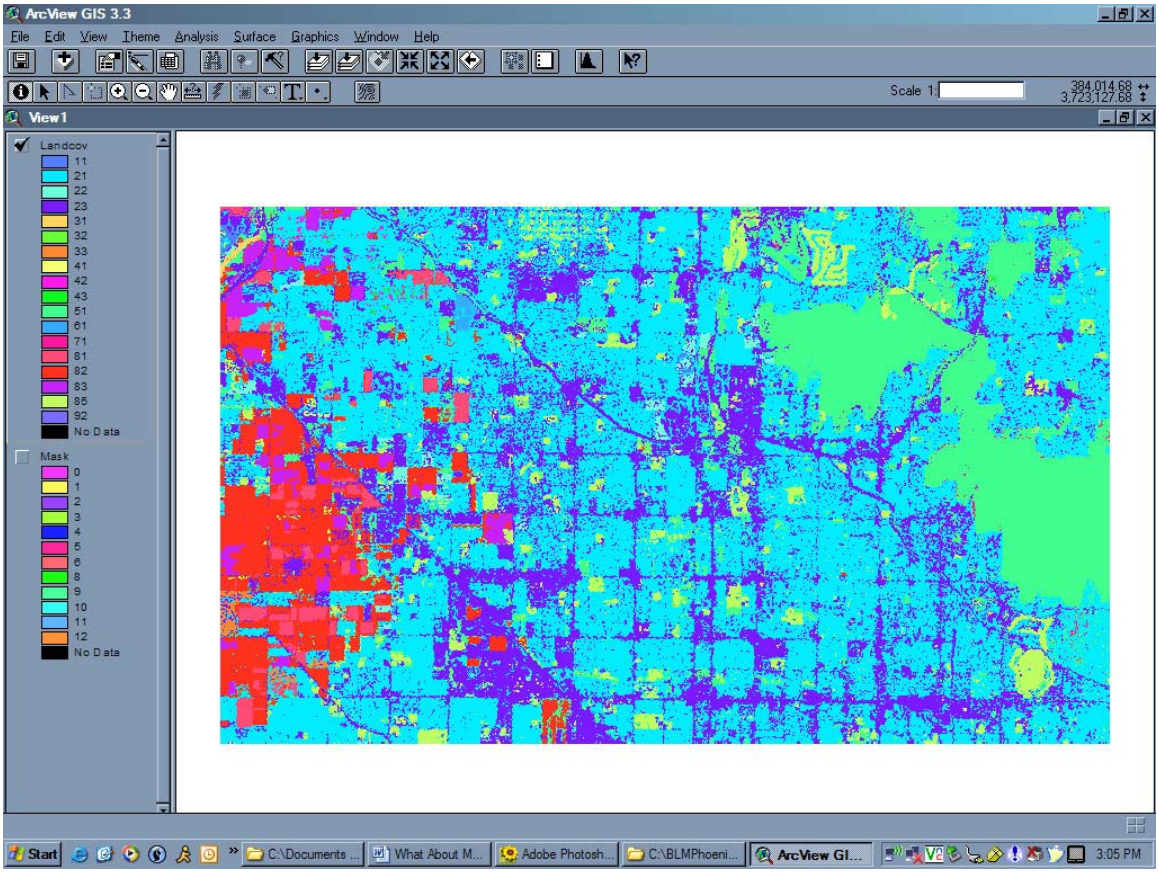


Figure A-9: The final clipped land use for the study area. This will be converted to landcov.asc. Its attribute table will be the basis of the landcov.txt file

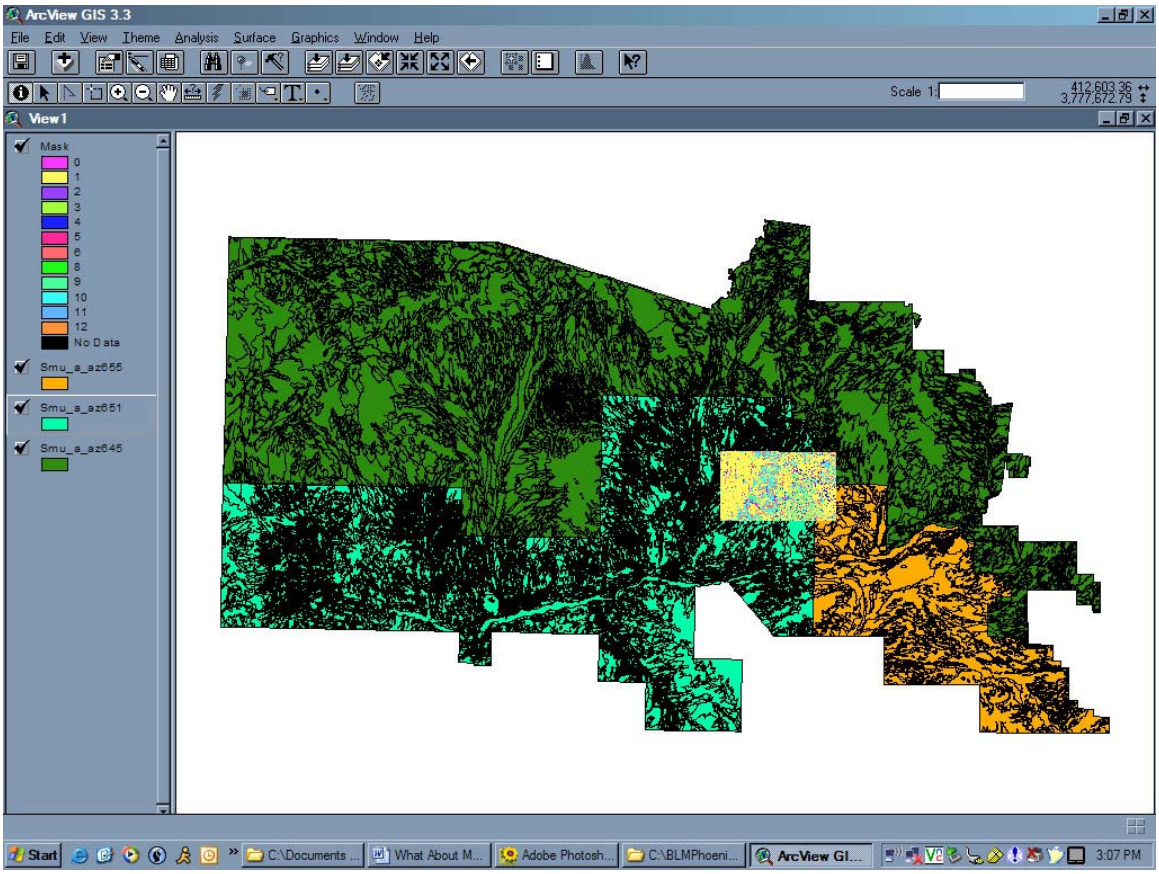


Figure A-10: All soil coverages the are within my study area (within the Mask)

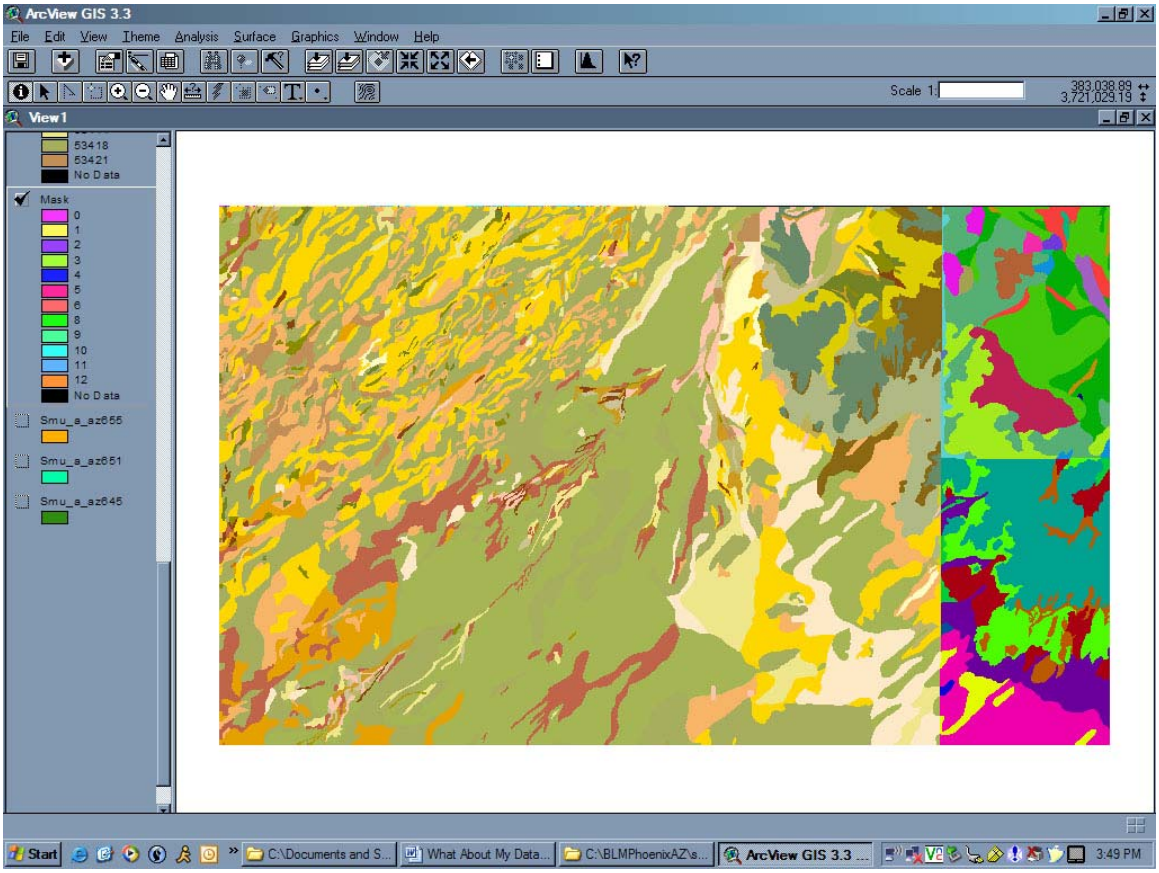


Figure A-11: The resulting three soil themes after the conversion process (the hard way). Still need to merge the three soil themes into one soilsmap theme.

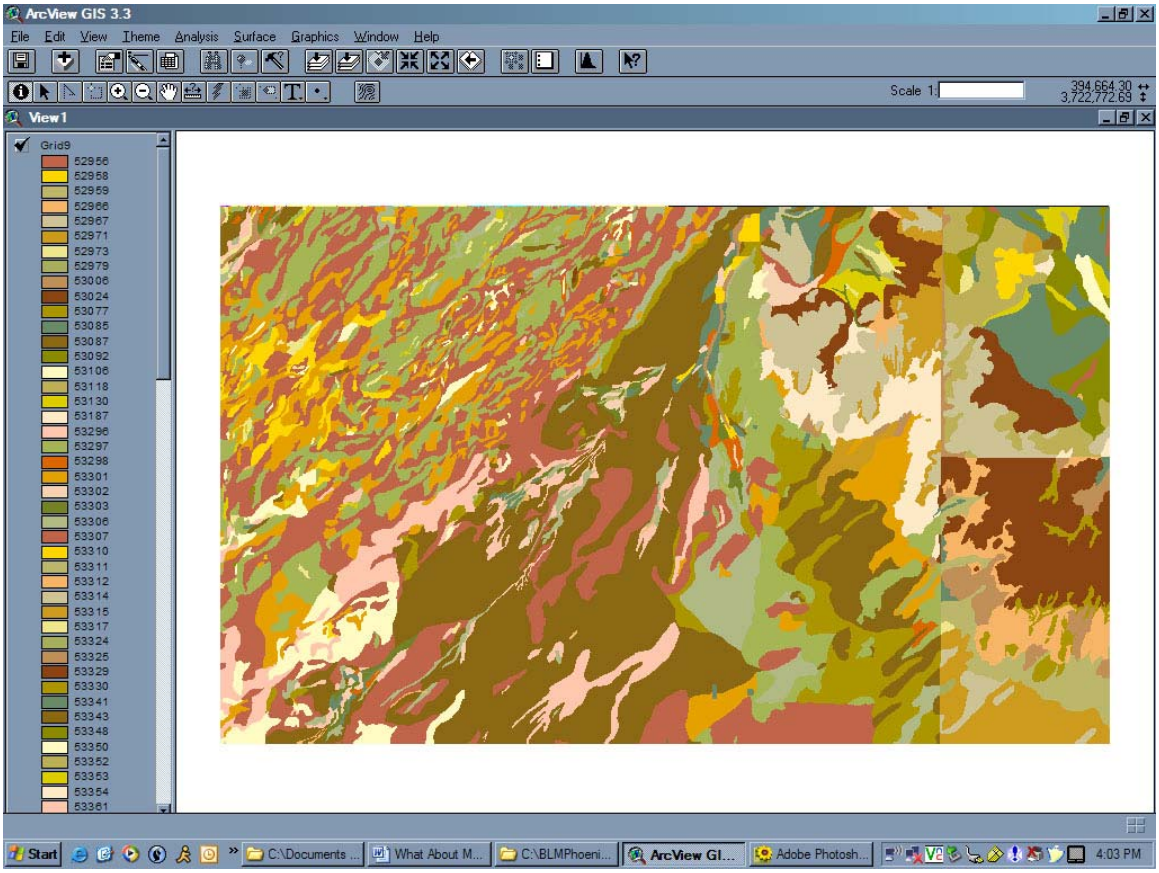


Figure A-12: The final merged soilsmap grid. This theme will be converted to soilsmap.asc. Its attribute table will be the basis of the soilsmap.txt file. As you can see, this process may not be perfect – evident by the artificial boundaries.

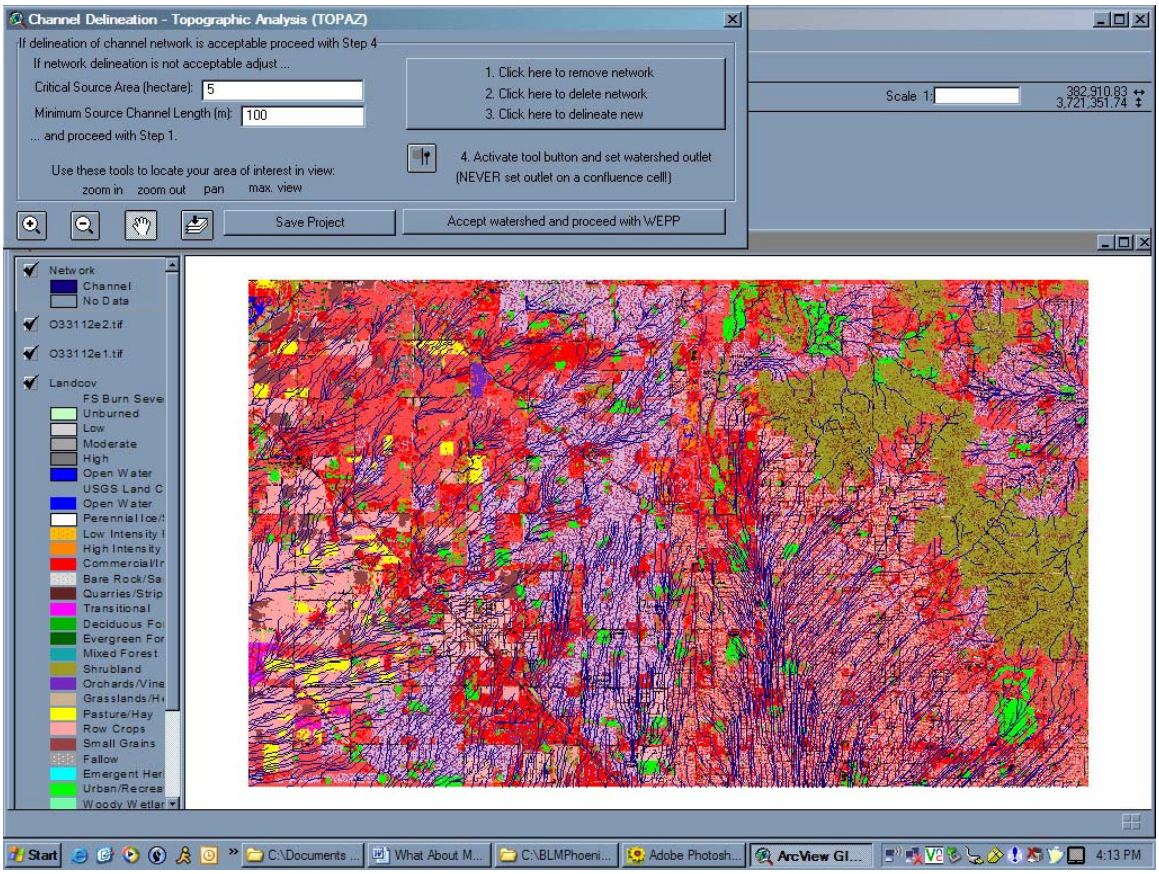


Figure A-13: The prepared data loaded into GeoWEPP

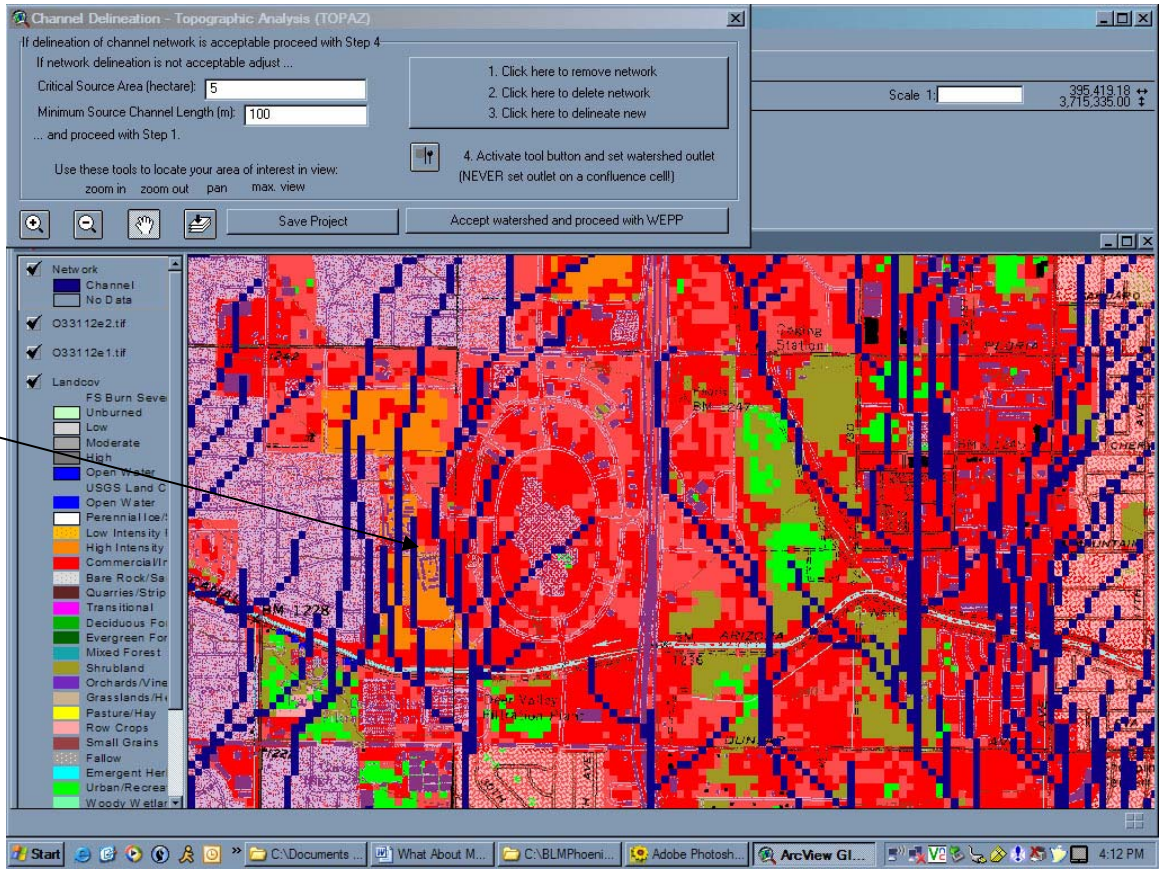


Figure A-14: Zoom in of my study area,
BLM National Training Center, Phoenix, Arizona
(approximately where arrow is pointing)